

RECORD OF DECISION
OPERABLE UNIT 3-TERRESTRIAL

JACKSON PARK HOUSING COMPLEX
BREMERTON, WASHINGTON

JULY 28, 2011



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**JACKSON PARK HOUSING COMPLEX
OPERABLE UNIT 3-TERRESTRIAL
RECORD OF DECISION**

DECLARATION

Site Name and Location

Operable Unit 3-Terrestrial, Jackson Park Housing Complex
Site Address: Bremerton, Kitsap County, Washington 98312

EPA ID: WA3170090044

The location of the administrative record for this site is:

Naval Facilities Engineering Command Northwest
Public Affairs Office
1101 Tautog Ave, Suite 203
Silverdale, WA 98315
(360) 396-6387

Statement of Basis and Purpose

This Record of Decision (ROD) presents the selected remedy for Operable Unit 3-Terrestrial (OU 3T), Jackson Park Housing Complex (JPHC) in the northern portion of Bremerton, Washington. The OU 3T JPHC site represents a portion of land that was part of the Naval Ammunition Depot (NAD) Puget Sound, which operated from 1904 to 1959 on the west side of Ostrich Bay in what is now Bremerton, Washington. During its operations, NAD Puget Sound handled, loaded, assembled, packaged, manufactured, demilitarized, and disposed of military munitions, with most activity occurring during World War II. Following its closure, 232 acres of the NAD Puget Sound property was converted to U.S. Navy (Navy) residential housing, the present-day JPHC. Development of the residential housing location began in 1965, and the most recent structures, a teen center and a drive-through pharmacy, were completed in 2006. There are currently 530 structures on the JPHC site. Of these, 190 are residential housing, 11 are community buildings (day care center, community center, picnic gazebos, restrooms, etc.), 325 are carports/garages, and 4 are former magazines.

The JPHC/Naval Hospital Bremerton (NHB) Superfund site was added to the National Priorities List (NPL) in 1994 for management of chemical contaminants and ordnance under the Comprehensive Environmental Response, Compensation, and Liability Act. The Navy divided the JPHC/NHB site into OU 1 and OU 2 in May 1995. In 2004, a Federal Facilities Agreement was completed to establish a procedural framework and schedule for developing, implementing, and monitoring appropriate response actions at the NPL site. Prior to completion of the Federal Facilities Agreement, a ROD for OU 1 addressing all human health risks and groundwater impacts within the terrestrial portions of the JPHC/NHB site was issued in August 2000. The

remedial investigation for OU 2 to assess impacts to the marine environment within Ostrich Bay is in progress under the framework of the Federal Facilities Agreement.

OU 3 was established as part of the NPL site in 2000 and was incorporated into the Federal Facilities Agreement to address the concern that discarded military munitions (DMM) or material potentially posing an explosive hazard (MPPEH) might remain at JPHC/NHB and present a hazard to human health and the environment. OU 3 comprises three separate sub-units: OU 3-Terrestrial JPHC (OU 3T JPHC); OU 3-Terrestrial NHB (OU 3T NHB); and OU 3 Marine (OU 3M). OU 3T JPHC includes both the upland areas of the housing complex and the intertidal area of Ostrich Bay. OU 3T NHB includes the upland areas of NHB, which is a secure Navy base supporting the medical mission of the Navy. OU 3M was created to address potential impacts to subtidal areas of Ostrich Bay resulting from historic NAD Puget Sound operations. Separate decision documents will be developed for OU 3T NHB and OU 3M.

Discarded munitions and explosives of concern (MEC) have been found at OU 3T JPHC as a result of former NAD Puget Sound Operations. Title 32 Code of Federal Regulations (32 CFR) Part 179, dated October 5, 2005, the Department of Defense Munitions Response Site Prioritization Protocol, defines MEC as specific categories of military munitions that may pose unique explosive safety risks, such as unexploded ordnance (UXO), DMM, or munitions constituents present in high enough concentrations to pose an explosive hazard. DMM is defined as military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. UXO, according to the document, is defined as military munitions that have been primed, fused, armed, or otherwise prepared for action; have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and remain unexploded, whether by malfunction, design, or any other cause. The MEC hazards at OU 3T JPHC are associated with DMM. The operational history of former NAD Puget Sound does not indicate the potential for UXO being present at the site (i.e., no history of live fire or range related munitions use). In addition, there is no evidence through historical reference of any UXO found in any prior investigations.

The selected remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, and the National Contingency Plan. This decision is based on the Administrative Record file for this site.

The Navy is the lead agency for this decision. The U.S. Environmental Protection Agency (EPA) is the lead regulatory agency. EPA and the Navy jointly select the remedy for the site.

Assessment of Site

Because of the nature of the explosive hazard posed by MEC and because it is not technically possible to completely eliminate the potential for future encounters with DMM at the site, the

selected remedy described in this ROD is necessary to protect public health or welfare or the environment from potential residual explosive hazards.

Description of Selected Remedy

The selected remedy for OU 3T JPHC addresses management of potential risk from explosive contact with DMM and includes a combination of removal and treatment actions and land use controls (LUCs) to manage the potential explosive hazard. Removal of subsurface metallic items will be accomplished through excavation of 100 percent of anomaly locations in grids where four DMM with high explosives (HE) (DMM-HE) were recovered in the upland parts of OU 3T JPHC and excavation of 100 percent of anomaly locations in the OU 3T JPHC intertidal zone.

Based on evaluation of historical operations at NAD Puget Sound and results of removal actions and remedial investigations conducted at the site, it has been determined that the likelihood of encounter with DMM items at the site is low. However, due to technology limitations, it is not possible to completely eliminate the potential to encounter DMM items in all areas of the site. In the upland portion of OU 3T JPHC, some potential for explosive contact hazard may result from erosion of soils, removal of overburden during intrusive activities (e.g., digging holes for construction or utility construction), or household activities such as gardening. In the intertidal portion of OU 3T JPHC, some explosive contact hazard may result from disturbance of sediments by tidal action or by digging during shellfish harvesting. LUCs will include use of the existing dig permitting and education and awareness programs, with additional munitions recognition and response training for key personnel involved in managing the dig permitting process and those managing the ground-disturbing construction activities at the site.

The selected remedy for OU 3T fits into the prior and existing assessment and management strategies that have been used or are currently in place to address MEC hazards at JPHC. Implementation of the selected remedy will provide greater certainty that potential explosive hazards associated with DMM encounters are low, as well as provide some reduction in the DMM incidence rates for the site. LUCs included as part of the selected remedy will effectively manage the low degree of residual explosive hazard allow unrestricted use of the site for residential housing and for recreational, subsistence, and commercial harvesting of shellfish.

The removal and treatment component of the selected remedy includes:

- Investigation and removal of 100 percent of the detected subsurface metallic anomalies (approximately 1,107 anomalies) in the three upland grids where DMM-HE was found in Phase 1 or Phase 2 of the remedial investigation (RI);
- If DMM-HE items are found within the upland investigation grid boundary, removal of additional detected metallic anomalies may be undertaken in the immediate vicinity of each grid; and
- Investigation and removal of 100 percent of the detected subsurface metallic anomalies (approximately 17,300 anomalies) in the intertidal zone between mean higher high water and mean lower low water.

The LUC component of the selected remedy includes:

- Existing LUCs for JPHC require that residents, as well as those conducting ground-disturbing activities at JPHC, receive ordnance education and awareness training. This training includes site history, basic munitions recognition information, and information concerning proper procedures to follow in the unlikely event of an encounter with a potential DMM item. For prospective residents of JPHC, Naval Base Kitsap Bangor Housing Office provides a notification regarding the potential presence of munitions. Prior to moving in, residents sign a document acknowledging they are aware of the munitions history at JPHC, understand the LUCs in place, and have notification information should any suspicious materials be encountered. In addition, a DVD presentation that provides information on the site history, as well as proper procedures to be followed in the event of a potential encounter with MEC, has been developed for use as part of the resident orientation process. Residents are required to view this video and acknowledge understanding of its content as a condition of their occupancy of housing.
- Existing LUCs for JPHC include an excavation and dig permitting process requiring a permit for ground-disturbing activity that is issued and managed through Navy Public Works office with support from the JPHC operations contractor. On-call response support for MEC items discovered during ground-disturbing activities is provided by the 911 response system and Explosive Ordnance Disposal Mobile Unit 11, Detachment Naval Base Kitsap Bangor.
- Continued compliance with the EPA Region 10 Final Policy on the Use of Institutional Controls at Federal Facilities (EPA 2009); including an initial institutional control status report, annual monitoring reports, 5-year review of the implementation and effectiveness of the institutional controls, and notification to EPA and the State of Washington in the event of a change of status of the site (e.g., ownership or change in land use).
- Enhanced training on a recurrent basis, provided by subject matter experts, for key personnel responsible for managing the dig permitting program or providing oversight at ground-disturbing activities at the site. The program provides additional site-specific training in munitions recognition and response procedures above the basic training, focusing heavily on additional munitions recognition and response.

Statutory Determinations

The selected remedy, in combination with recurring reviews and LUCs as described above, protects public safety and the environment for current and future land use. Furthermore, the remedy attains federal, state, and local requirements that are applicable or relevant and appropriate to the remedial action, and is cost effective. This remedy also satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment) by the investigation and removal of additional metallic anomalies that are potential DMM. However, due to practical and technological limitations, including anomaly detection and discrimination/identification methods, the presence of existing buildings and other existing infrastructure, it is not possible to entirely eliminate the potential for contact with DMM items at

this site. Because DMM may remain in place at OU 3T JPHC, statutory reviews will be conducted at least every 5 years to evaluate whether the remedy remains protective of human health.

Data Certification Checklist

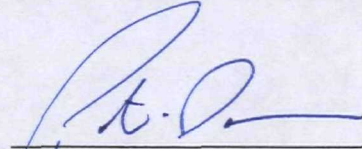
The following information is included in the Decision Summary Section of this ROD; additional information can be found in the Administrative Record for OU 3T JPHC.

- Materials of concern and their estimated distribution (Section 5.3)
- Baseline risk represented by the materials of concern (Section 7.1)
- Cleanup levels established for the materials of concern (Section 8)
- How source materials will be addressed (Section 11.2)
- Current and reasonably anticipated future land use assumptions used in the baseline risk assessment and ROD (Section 6.1)
- Potential land and groundwater use that will be available at the site as a result of the selected remedy (Section 11.4)
- Estimated capital, annual operation and maintenance, and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (Section 11.3); and
- Key factor(s) that led to selecting the remedy (Section 11.1).

July 28, 2011

Authorizing Signature

Signature: _____



Captain Peter Dawson
Commanding Officer
Naval Base Kitsap

Date: 7/28/11

July 28, 2011

Authorizing Signature

Signature:



Daniel D. Opalski
Director Office of Environmental Cleanup
Region 10
U.S. Environmental Protection Agency

Date:

7/28/2011

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ACRONYMS AND ABBREVIATIONS

ARAR	applicable or relevant and appropriate requirement
BERA	baseline ecological risk assessment
BMP	best management practice
BOSC	Base Operation Support Contractor
CENCOM	Kitsap County Central Communications
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COPC	contaminants of potential concern
CSL	contaminant screening level
CSM	conceptual site model
CWA	Clean Water Act
CZUMA	Coastal Zone Management Act
DDESB	Department of Defense Explosives Safety Board
DGM	digital geophysical mapping
DGPS	differential global positioning system
DMM	discarded military munitions
DMM-HE	discarded military munitions with high explosives
DMM-Pyro	discarded military munitions with pyrotechnics
DMM-SA	discarded military munitions with small arms
DNR	Washington State Department of Natural Resources
DoD	Department of Defense
DQO	data quality objective
DVD	digital versatile disc
Ecology	Washington State Department of Ecology
EFH	essential fish habitat
EOD	explosive ordnance disposal
EOD MU 11 Det. Bangor	Explosive Ordnance Disposal Mobile Unit 11, Detachment Bangor
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
Foster Wheeler	Foster Wheeler Environmental Corporation
FS	Feasibility Study
GDA	ground disturbing activity
GIS	geographic information system
HA	Hazard Assessment (MEC)

HE	high explosive
Health District	Kitsap County Health District
HQ	hazard quotient
IAG	Interagency Agreement
JPHC	Jackson Park Housing Complex
LOAEL	lowest-observed-adverse-effect level
LtMGT	long-term munitions and explosives of concern (MEC) management
LUC	land use control
MC	munition constituent
MEC	munitions and explosives of concern
MHHW	mean higher high water
MLLW	mean lower low water
mm	millimeter
MMR	military munitions rule
MPPEH	material potentially presenting an explosive hazard
MRSP	Munitions Response Site Prioritization Protocol
MTCA	Model Toxics Control Act
NAD	Naval Ammunition Depot
Navy	U.S. Navy
NBK	Naval Base Kitsap
NFA	No Further Action
NHB	Naval Hospital Bremerton
NCP	National Contingency Plan
NGVD29	National Geodetic Vertical Datum of 1929
NOAEL	no-observed-adverse-effect level
NOSSA	Naval Ordnance Safety and Security Activity
NAVFAC	Naval Facility Engineering Command
NAVSEA	Naval Sea Systems Command
NPL	National Priorities List
O&M	operation and maintenance
ORR	operational readiness review
OU	Operable unit
OU 3M	Operable Unit 3-Marine
OU 3T	Operable Unit 3-Terrestrial
PA	preliminary assessment
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
RAB	Restoration Advisory Board
RAO	remedial action objective

RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
RI	remedial investigation
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
SI	site investigation
SMS	sediment management standard
SQS	sediment quality standard
SQG	sediment quality goal
SVOC	semi-volatile organic compound
TBC	To be considered
TBT	tributyltin
TCRA	time critical removal action
TDEM	time-domain electromagnetic
TFU	thermal flashing unit
TRV	toxicity reference value
TtEC	Tetra Tech EC, Inc.
USC	United States Code
UXO	unexploded ordnance
WAC	Washington Administrative Code

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**JACKSON PARK HOUSING COMPLEX
OPERABLE UNIT 3-TERRESTRIAL
RECORD OF DECISION**

DECISION SUMMARY

1. SITE NAME, LOCATION, AND DESCRIPTION

This Record of Decision (ROD) presents the selected remedy for Operable Unit 3-Terrestrial (OU 3T), Jackson Park Housing Complex (JPHC) [OU 3T JPHC], in Kitsap County, Washington. Discarded munitions and explosives of concern (MEC) have been found at OU 3T JPHC as a result of the past use of this land as Naval Ordnance Depot (NAD) Puget Sound.

In accordance with Executive Order 12580, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), the U.S. Navy (Navy) is addressing residual explosive hazards at JPHC by undertaking remedial action. The selected remedial actions have the approval of the U.S. Environmental Protection Agency (EPA) and are responsive to the expressed concerns of the public. The selected remedial actions will comply with applicable or relevant and appropriate requirements (ARARs).

The Navy is the lead agency for this decision. The EPA is the lead regulatory agency. The Suquamish Tribe and the Washington Department of Natural Resources (DNR) provided input to the development of this ROD. Funding for the remedial actions described in this ROD will be provided from the Navy's Environmental Restoration Navy Munitions Response Program budget.

1.1 Site Location

JPHC is located in the northern part of Bremerton (Kitsap County), Washington. The site address is Kitsap County, Washington, 98312 (Figure 1-1). The site is administered by Naval Base Kitsap (NBK) Bangor.

1.2 Site Description

JPHC is a densely developed military housing area operated by the Navy on the west side of Ostrich Bay. State Highway 3 is west of JPHC. The 232-acre OU 3T JPHC site includes 186 upland acres and 46 acres in the Ostrich Bay intertidal zone (Figure 1-2). Naval Hospital Bremerton (NHB) is north of JPHC. Together, JPHC and NHB have been designated as a Superfund site (CERCLIS identification number WA3170090044); however, OU 3T JPHC does not include NHB.

This ROD for OU 3T JPHC addresses discarded military munitions (DMM) that may be present on JPHC property or in the intertidal portion of Ostrich Bay. Two additional RODs will be prepared for OU 3T NHB and OU 3 Marine (OU 3M). The Remedial Investigation

July 28, 2011

(RI)/Feasibility Study (FS) [RI/FS] report has been completed for OU 3T NHB (TtEC 2010c). The draft final RI/FS for OU 3M was submitted to EPA on November 1, 2010, and is awaiting finalization.





Figure 1-2. Operable Unit 3T JPHC Site Location

Note: The yellow boundary represents the boundary of LUCs in this ROD.

2. SITE HISTORY AND ENFORCEMENT ACTIVITIES

The site history, summarized from the RI/FS Report (TtEC 2010a), is presented below.

2.1 Site History

JPHC is on the site of the former NAD Puget Sound that was established in 1904 and was active through 1959. NAD Puget Sound operations included assembly, transportation, storage, and demilitarization of military weapons and ammunition. The facility experienced its highest level of activity during World War II.

No direct manufacturing processes, such as production of propellant or machining of shell casings, took place at the depot. Historical records show the most common items assembled at the site were 20-millimeter (mm) projectiles, 40-mm projectiles, 5-inch projectiles, 14-inch projectiles, and 14-inch bag charges (Foster Wheeler 2002a). Significant munitions-related uses and the corresponding areas included:

Assembly—Assembly buildings were consolidated near the shoreline to the south of Elwood Point. Significant processing (assembly, rework, and demilitarization) of munitions occurred throughout this area.

Transportation—Materials were largely brought to the site by marine transport. Two transfer piers were located near the manufacturing buildings to the south of Elwood Point (only Pier 2 remains), and a railroad transfer pier was located on the east side of Elwood Point. A rail yard and roundhouse were located on Elwood Point. Significant munitions handling occurred in these areas.

Storage—Munitions storage facilities were spaced throughout the site. In many cases, these were isolated buildings set in then wooded areas. The buildings were connected by roadways and, in later years, by rail.

Treatment/Disposal—Wastes, including munitions from the assembly process, were burned on the beach during low tide. A concrete slab on Elwood Point was used for burning munitions and an incinerator was located at Elwood Point. Munitions remediation activities at Elwood Point were conducted from 1998 to 2001 (Foster Wheeler 2002b,c,d).

NAD Puget Sound was closed in 1959, but remained military property in caretaker status following closure. Construction of military housing on the site began in 1965 and the site was reassigned to the Puget Sound Naval Shipyard in 1975, and renamed Jackson Park. In 1977, approximately 50 acres were transferred to the Naval Regional Medical Center for a new hospital (NHB).

Portions of the northern, western, and southern areas of the former NAD Puget Sound have been transferred to the City of Bremerton for a park and school, to the State of Washington for Route 3, and to private developers for the Erlands Point Apartment Complex. These areas have been investigated for munitions by the U.S. Army Corps of Engineers and a no further action

determination has been issued by the Washington State Department of Ecology (Ecology) for these areas. A detailed site description and history of the former NAD Puget Sound operations are presented in the Final Archive Search Report (Foster Wheeler 2002a).

2.2 Project History

Munitions clearance and response activities were conducted on an intermittent basis as part of the facility operations and as part of Navy Explosive Ordnance Disposal (EOD) operations through 1998. Additional munitions response activities were completed by joint contractor/EOD operations between 1998 and 2004. These operations were implemented under CERCLA as part of a time-critical removal action (TCRA), through the OU 1 ROD, the Phase 1 RI, and also as part of ongoing facility reconstruction operations. Through December 2007, 17 DMM items that were 20 mm and larger containing high explosive (DMM-HE), propellant, or incendiary materials (i.e., flares) were recovered from the terrestrial portion of JPHC. The items with the highest net explosive weight recovered were three unfired and unarmed 40-mm projectiles and one complete 40-mm cartridge.

2.2.1 Explosives Ordnance Disposal Recovery, 1980 to 2005

Three reports of Explosive Ordnance Disposal Mobile Unit 11, Detachment Bangor (EOD MU 11 Det. Bangor) responses were found in the available historical record regarding terrestrial recovery at JPHC prior to 1998; none involved DMM-HE. Additionally, EOD MU 11 Det. Bangor recovered 10 small arms rounds in March 2005. Other references to the discovery of DMM were found, but no substantiating information regarding dates, locations, types, or quantities was available. Information concerning the munitions-related work accomplished by EOD MU 11 Det. Bangor is presented in greater detail in the Final Preliminary Assessment/Site Investigation (PA/SI) (Foster Wheeler 2002e).

2.2.2 Pre-Remedial Investigation, 1998 to 1999

A munitions investigation was conducted at JPHC as part of a shoreline and recreation area investigation between June 1998 and January 1999. The investigation included a surface clearance, geophysical survey to identify metallic anomalies that could represent MEC, and excavation of 290 test pits and 5 trenches in selected sub-grids. The test pits were advanced to investigate over 500 distinct mapped anomalies. No DMM-HE items were found during this investigation. Over 5,000 20-mm and 40-mm empty shell casings were found in a particular area of the shoreline where they appeared to have been used as fill. As a result, the scope and schedule of a planned shoreline construction project were altered to include a material potentially presenting an explosive hazard (MPPEH) clearance in advance of the construction. Additional information concerning the work accomplished is presented in the Final Abandoned Ordnance Report, Volume 1 (Foster Wheeler 2002b).

2.2.3 OU 1 ROD and TCRA, 1999 to 2001

A ROD for OU 1 addressing chemical contamination at the JPHC/NHB site was executed in August 2000 (Navy 2000). The OU 1 ROD was prepared to mitigate human health posed by the ingestion of soil, potential environmental risks caused by erosion of fill material and deposition of fill materials in the marine environment, and human health risks and environmental risks from groundwater. The selected remedy for impacted soils and groundwater at OU 1 included the following:

- Placement of a minimum 1-foot thick soil cover over approximately 16 acres of the site, including the shoreline area of OU 1 (Figure 2-1), and 4 other small areas in the vicinity of grids 6, 8, 141, 143, and 235-236;
- Installing shoreline protection features to limit erosion along approximately 2,700 feet of shoreline in the Elwood Point area;
- Removal of creosote-treated pilings from Ostrich Bay and marine tissue monitoring;
- Removal of the source of groundwater contamination and perform groundwater monitoring;
- LUCs to limit the future use of groundwater, maintain the soil cover, maintain shoreline protection features, control excavations, and limit residential development in areas remediated under the ROD;
- Deed and land use restrictions in the event of transfer of the JPHC/NHB site.

The remedial action for OU 1 soil was conducted from August 2000 to June 2002 (Foster Wheeler 2002a,c,d) and the Navy conducted a TCRA for munitions under OU 3 as part of the OU 1 remediation (Navy 2000, p. 3-9). The remediation activities started in the southern part of the shoreline at JPHC and progressed northward. As the construction activities progressed, the shoreline protection system was installed first, followed by the munitions removal TCRA. The soil cover was placed following completion of the munitions removal activities.

The TCRA originally involved DMM clearance by excavating 1 foot of soil, mechanically screening the soil, and local placement of a geotextile indicator layer prior to backfilling the excavated area with screened soil or clean fill (Figure 2-1). The site, except areas designated for pavement, was then covered with a 4- to 6-inch layer of topsoil and sod.

After completion of the soil remediation activities in the southernmost 4 acres of the shore, a large-caliber Coast Guard round was found at the intersection of South Shore Road and Dowell Road. This caused a reassessment of the techniques used for munitions removal in order to avoid contacting large munitions. For the remaining 11.7 acres of the remediation area (north of grid 14), previously obtained electromagnetic data were used to identify 2,475 metallic anomalies that were individually excavated to a depth of 2 feet (including the ball field on the NHB property). Following removal of these targets, heavy equipment was used to remove the

uppermost 1 foot of soil. Placement of the geotextile, soil backfill, and topsoil was continued in this area as described above. During the ROD/TCRA activities, four DMM-HE items were recovered: a projectile nose fuze, a 40-mm projectile, a 1-pounder projectile, and a 5-inch projectile base fuze. In total, 4,589 other munitions-related items were also found, ranging from non-HE-containing DMM (e.g., small arms) to MPPEH scrap.

Also, to meet the requirements of the OU 1 ROD, in May and June 2002, Navy contractors removed soil containing polynuclear aromatic hydrocarbons (PAHs) to a depth of 2 feet over five 50-foot by 50-foot grids on the east side of several residential buildings on Haven Road (Figure 2-1). This location is the center of the former manufacturing area. A surface clearance of metallic items in the area was performed using hand-held magnetometers prior to the soil removal and 143 subsurface metallic anomalies were identified after the surface clearance. No DMM or MPPEH items were encountered during the intrusive investigation of these 143 targets. The excavation was backfilled with clean soil and sod was placed to restore the area to its initial condition.

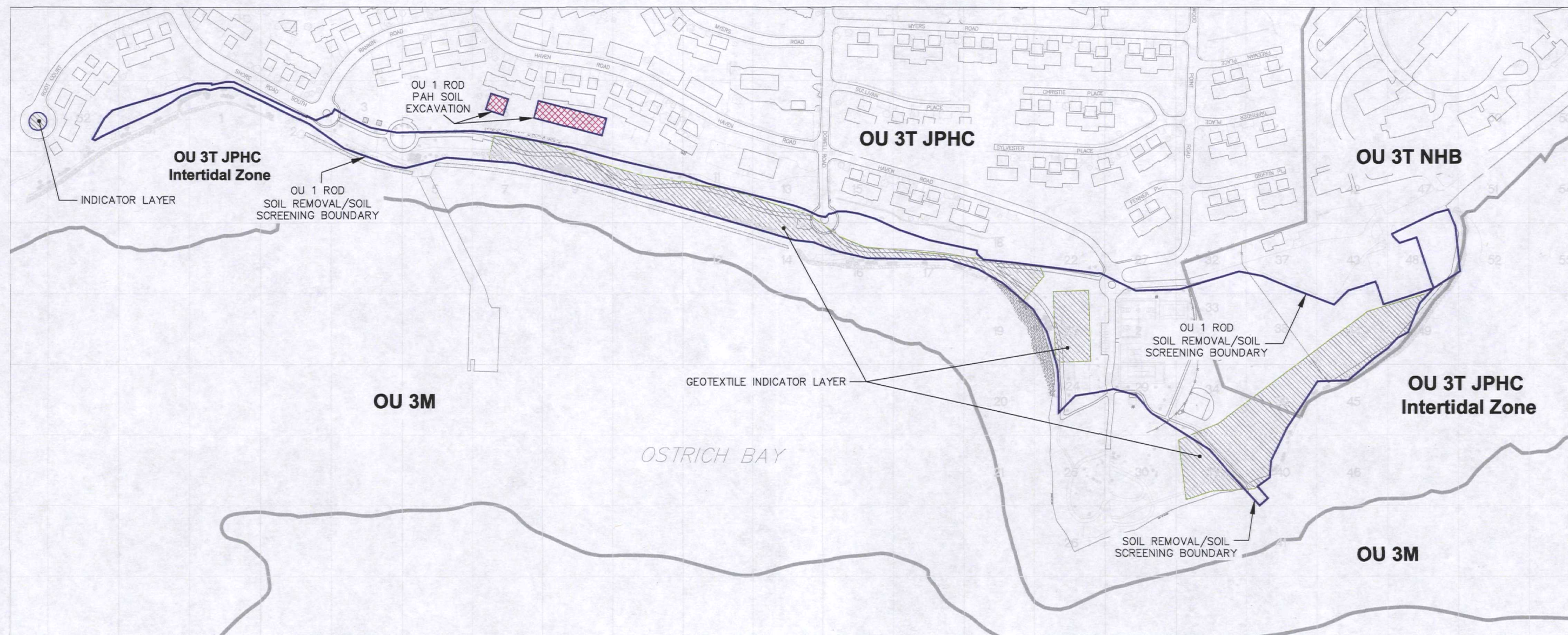
2.2.4 Preliminary Assessment/Site Investigation




The PA/SI represented the first step in the CERCLA assessment and cleanup for munitions at OU 3T JPHC. No field investigations for MEC items were conducted during the PA/SI (Foster Wheeler 2002e). The PA/SI report provides information concerning munitions-related operations at the former NAD Puget Sound. It also provides a description of the site-specific geographic information system- (GIS-) based munitions hazard assessment developed to determine the relative level of hazard associated with potential residual munitions-related items. The results of this munitions hazard assessment were later superseded by preliminary application of the MEC Hazard Assessment (MEC HA) included in Appendix A of the OU 3T JPHC Phase 2 RI Work Plan (TtEC 2007a), followed by the final evaluation using the MEC HA and data from Phase 2 of the RI (TtEC 2010a).

2.2.5 Phase 1 Remedial Investigation

The Phase 1 RI for OU 3T was conducted at JPHC between March 2003 and August 2004. The purpose of the action was to perform digital geophysical mapping (DGM) of the site to identify items that might be DMM. A detailed discussion of the methodologies associated with the Phase 1 RI is presented in the Phase 1 RI Field Work Summary Report (TtFW 2005). There were four principal activities accomplished:

1. **Vegetation removal** to allow site access.
2. **Surface clearance by UXO technicians.** Metallic materials encountered to 2 inches below the surface, including potential DMM, were removed to eliminate metallic interference from the surface prior to performance of the geophysical investigation.



-  OU 1 soil removal and TCRA 2000 to 2002
-  Geotextile indicator layer approximately 1 foot below ground surface
-  Operable unit boundary

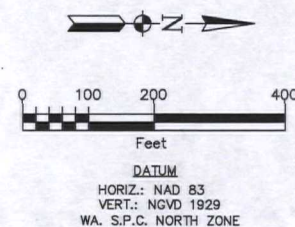


Figure 2-1

OU 1 ROD/TCRA Soil Removal
Location and Geotextile Indicator
Layer Placement

Jackson Park Housing Complex/
Naval Hospital Bremerton,
Washington

3. **Performance of the DGM.** Time-domain electromagnetic (TDEM) equipment coupled with positioning equipment was used identify the presence of buried metallic items (anomalies).
4. **Interpretation of the DGM data.** This analysis was done to identify subsurface anomalies.

TDEM DGM techniques were used to survey 154 of the site's 232 acres. Areas not surveyed included 60 acres under buildings and roadways, 9 acres inaccessible because of steep or heavily wooded terrain or standing water, and 9 acres previously investigated during implementation of the OU 1 ROD.

During performance of the surface clearance, 38,303 individual anomalies were investigated and 27,660 of these anomalies were within 2 inches of the ground surface. The investigated surface anomalies included six DMM-HE, one DMM without HE, 1,701 small arms and MPPEH items, and 25,888 pieces of scrap metal. Sixty-four individual grains of smokeless powder were also visually detected and removed from the intertidal area during the surface clearance. The recovered items were turned over to the local Navy EOD detachment for disposal. The remaining 10,643 anomalies identified and investigated during Phase 1 were from magnetometer anomalies below the 2-inch surface clearance depth, and the excavations at these anomaly sites were not continued below the 2-inch depth. Forty-eight additional small arms rounds were recovered in 2005 during visual beach inspections.

The seven DMM items recovered represented 0.025 percent of the 27,660 anomalies investigated during the surface clearance. In total, 368 pounds of MPPEH were recovered. The MPPEH was flashed in the on-site thermal flashing unit, shredded, and recycled. Miscellaneous metal debris totaling 22,640 pounds was removed and recycled during the Phase 1 RI surface clearance.

Upon completion of the Phase 1 RI surface clearance, DGM of subsurface metallic anomalies was performed using TDEM survey equipment supported with differential global positioning systems (DGPS). In total, 100,590 anomalies were identified during the interpretation process. The anomalies identified included 94,383 anomalies mapped in areas surveyed during the Phase 1 RI, and an additional 6,207 associated with areas in the shoreline recreational area surveyed during implementation of the OU 1 ROD.

2.2.6 Phase 2 Remedial Investigation

The OU 3T JPHC Phase 2 RI was an intrusive investigation to obtain more definitive data on the nature, extent, and distribution of DMM. Planning for the Phase 2 RI began in 2004 prior to the conclusion of the Phase 1 RI and continued through early 2007. The field investigations for the Phase 2 RI were conducted between March and December 2007. The three principal activities included:

1. **Target Selection.** Of the 100,590 total individual anomaly locations identified during subsurface surveys, 75,005 qualified individual anomaly locations were identified as potential targets for further investigation after thorough evaluation of the OU 3T JPHC

dataset. The remaining anomaly locations were eliminated on the basis of location, or other considerations (i.e., targets located under the geotextile indicator layer placed along the shoreline during the OU1 ROD (Foster Wheeler 2002d), as well as those classified as likely utilities, other cultural features, or noise). Through an adaptive interpretation of the One Sample Proportion Test, 12.6 percent of the locations (9,457) were established for investigation to provide a statistically significant data set.

2. **Target Reacquisition.** Anomaly locations of interest for intrusive investigation were reacquired in the field by geophysicists using similar geophysical equipment to that used for the Phase 1 geophysical survey. Targets were marked with pin flags to facilitate visual location of investigation sites by the unexploded ordnance (UXO) teams.
3. **Intrusive Investigation.** Target locations were investigated by qualified UXO personnel to determine the presence or absence of DMM. In total, 9,460 locations were investigated to meet the established data quality objectives (DQOs) for the investigation. DMM items recovered were turned over to EOD MU 11 Det. Bangor for disposal.

The sample set was determined through an adapted implementation of the One Sample Proportion Test to provide an acceptable statistical method for determining the minimum sampling rate necessary to demonstrate that the DMM incidence rate did not exceed a threshold value of 25 DMM-HE items per 100,000 subsurface anomalies investigated (i.e., 0.00025) with 95 percent confidence. Based on this sampling program, it was determined that excavation and identification of 12.6 percent of the 75,005 eligible anomaly locations (9,457 anomaly locations) was required to meet project DQOs. The anomalies to be evaluated were further stratified by application of the 12.6 percent sampling rate at the grid-specific level such that 30 percent of the samples were drawn from the anomalies reading less than 10 millivolts of the EM-61 channel 2 early time (216 microsecond) gate, and 70 percent were drawn from the samples reading greater than 10 millivolts on the channel 2 early time gate.

The results of the geophysical investigation showing the digitally georeferenced targets identified (Phase 1 RI-yellow) and targets investigated (Phase 2 RI-red) are shown on Figure 2-2. The Phase 2 RI results included:

- 9,460 individual anomaly locations excavated.
- 23,913 anomalies removed totaling approximately 15,833 pounds of metal.
- 2 DMM-HE recovered (40-mm projectile, 40-mm round).
- 3 DMM with no HE recovered (20-mm practice round, marine marker flare, parachute flare).
- 117 small arms items or smokeless powder grains recovered.
- 1,130 pieces of MPPEH (consisting of non-energetic materials such as ammo can lids and shell casings) recovered.

Locations of recovered DMM items are shown on Figure 2-3.

2.3 History of CERCLA Enforcement Activities at OU 3T JPHC

The Navy initiated the RI/FS process at JPHC/NHB after conducting PAs (NEESA 1983; Hart Crowser 1988).

Ecology notified the Navy that it was a "potentially liable person" under RCW 70.105D.040 because of the presence of hazardous substances at the JPHC/NHB site on July 30, 1991. On February 18, 1992, pursuant to Revised Code of Washington (RCW) 70.105D.050(1), Ecology issued Enforcement Order No. DE-92-TC-112 to require the Navy to complete an RI/FS at the JPHC/NHB site in accordance with Chapter 173-340 Washington Administrative Code (WAC). This order was amended on May 2, 1994, to recognize and give effect to the provisions of the Defense/State Memorandum of Agreement, entered into by the State of Washington and Department of Defense (DoD) on February 3, 1994.

In 1994, EPA placed JPHC/NHB on the National Priorities List (NPL). The NPL is designed to categorize, rank, and expedite investigation and cleanup of the nation's primary hazardous waste sites. The Navy divided the JPHC/NHB site into OU 1 and OU 2 in May 1995 to address chemical impacts to the terrestrial and marine environments, respectively. OU 3 was added in 2000 specifically to address potential explosive hazards associated with past operations at NAD Puget Sound. The actions at OU 1, OU 2, and OU 3 are summarized in Section 4.

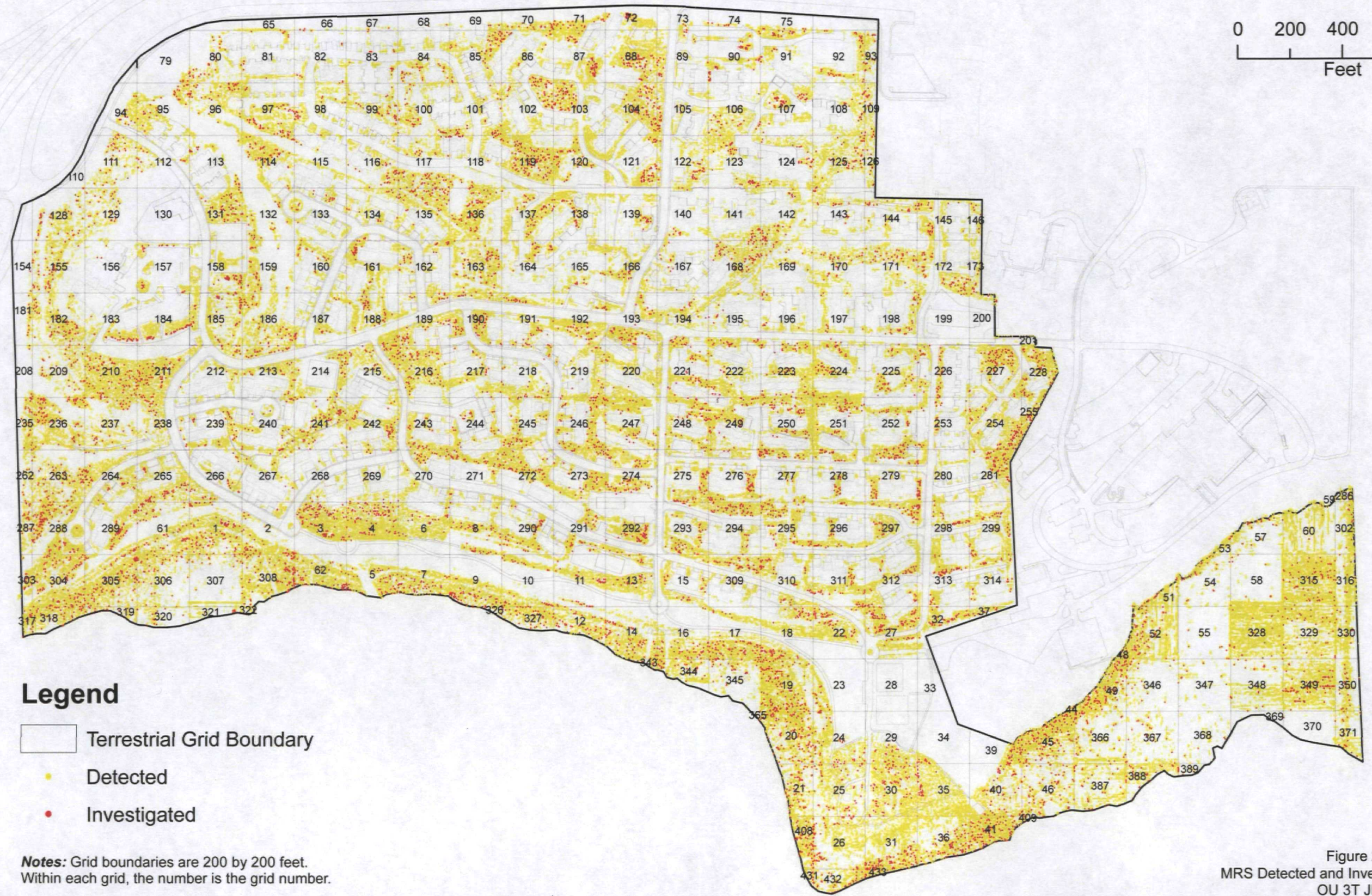
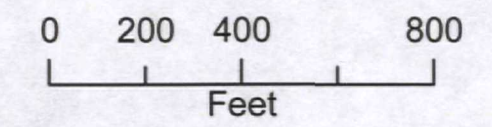
Ecology issued an amended enforcement order to the Navy effective March 27, 2002 (No. DE92TC-005), requiring remedial actions at OU 1, OU 2, OU 3T, and OU 3M.

EPA and the Navy entered into the Interagency Agreement (IAG) on November 1, 2004 (EPA/Navy 2004) to:

1. Ensure that the environmental impacts associated with past and present activities at the site are thoroughly investigated and appropriate remedial action taken as necessary to protect the public health, welfare and the environment;
2. Establish a procedural framework and schedule for developing, implementing, and monitoring appropriate response actions at the site in accordance with CERCLA, the NCP, Superfund guidance and policy, and Resource Conservation and Recovery Act (RCRA) guidance and policy; and
3. Facilitate cooperation, exchange of information, and participation of the parties in such actions.

July 28, 2011

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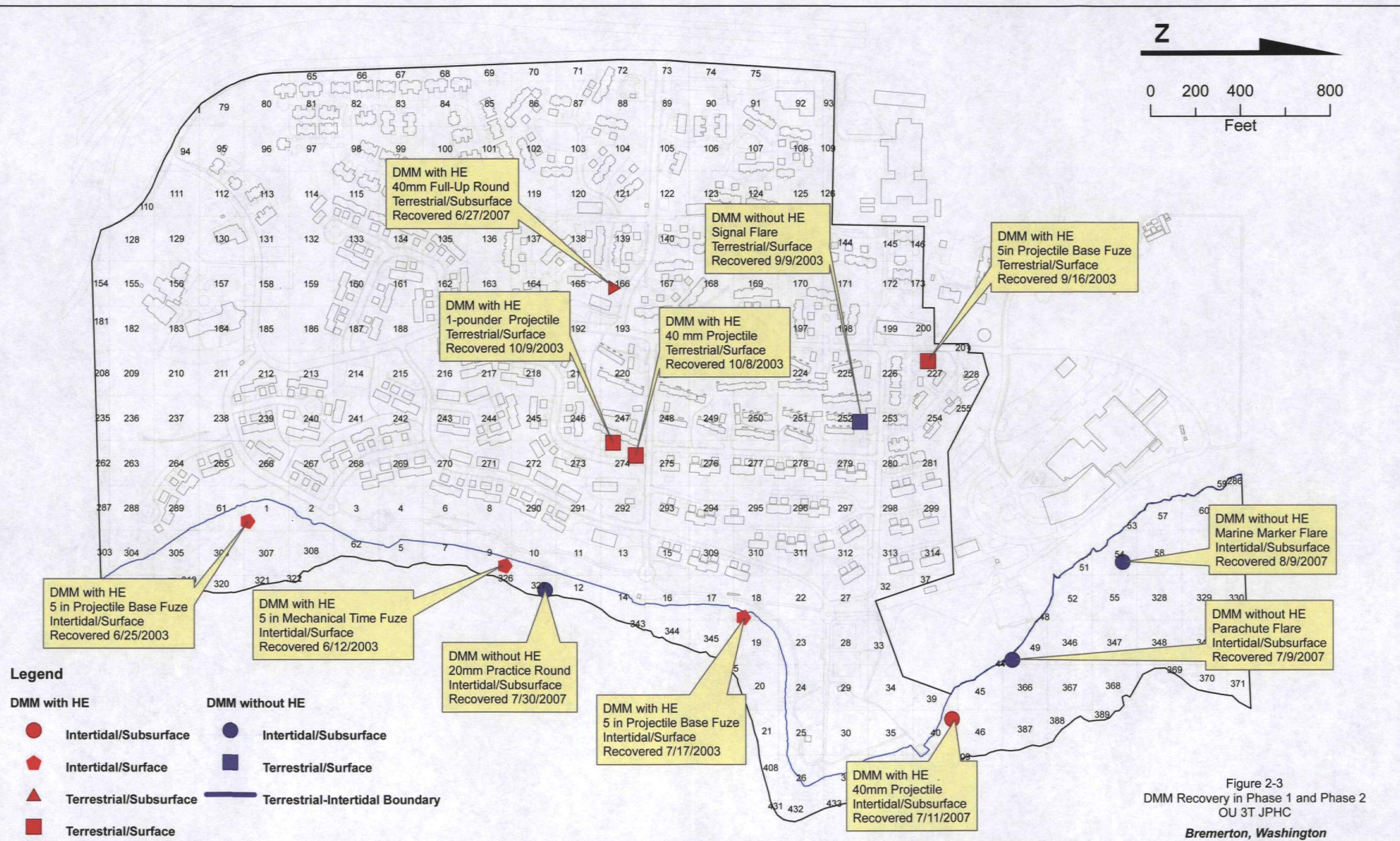


Legend

- Terrestrial Grid Boundary
- Detected
- Investigated

Notes: Grid boundaries are 200 by 200 feet.
Within each grid, the number is the grid number.

Figure 2-2
MRS Detected and Investigated Anomalies
OU 3T JPHC
Bremerton, Washington



3. COMMUNITY PARTICIPATION

The RI/FS Report (TtEC 2010a), Addendum to the RI/FS Report (TtEC 2010b), and Proposed Plan for OU 3T JPHC site (TtEC 2010d) were made available to the public in November 2010. A public comment period was held from November 1 to December 15, 2010. In addition, a public meeting was held on November 15, 2010, to present the Proposed Plan. Though the opportunity for discussion and comment was provided, there were no attendees representing the general public. One comment on the Proposed Plan was received from the Suquamish Tribe, and this comment is included in Section 14 of this ROD.

The administrative record for this site is at:

Naval Facilities Engineering Command Northwest
Public Affairs Office
1101 Tautog Ave, Suite 203
Silverdale, WA 98315
(360) 396-6387

The RI/FS report, addendum, and proposed plan are available for review at two locations:

Sylvan Way Branch, Kitsap Regional Library
1301 Sylvan Way, Bremerton, WA

Community Center, Jackson Park Housing Complex
90 Olding Road, Bremerton, WA

Project-specific efforts to involve, inform, and educate JPHC employees, site workers, residents, and the community are described below.

Community Update Newsletter—This newsletter summarizes Navy environmental activities in the region and is prepared by the housing manager on a quarterly basis. Along with other news of interest to housing residents, this newsletter provides an overview of site accomplishments and scheduled activities related to the munitions investigation and cleanup program at JPHC.

Munitions Awareness Materials—A visitor awareness program at JPHC includes posters placed in common areas (such as the Community Center), as well as information flyers for visitors and workers that describe the work being performed.

Currently, the Naval Base Kitsap Housing Office provides a notification to prospective residents of JPHC regarding the potential presence of munitions. A digital versatile disc (DVD) presentation providing information on the site history as well as proper procedures to be followed in the event of a potential encounter with MEC has been developed for use as part of the resident orientation process. Prior to occupying housing facilities, residents are required to view this video and sign a document acknowledging they are aware of the munitions history at JPHC, understand the LUCs in place, and have notification information should any suspicious items be encountered. A coloring book has been provided for the purpose of educating children regarding potential site hazards.

The Jackson Park Environmental/Munitions Clean-up website hosted by navylifepnw.com summarizes the status of remedial activities at JPHC and provides munitions awareness. The web site (<http://www.navylifepnw.com/site/400/JP-Munitions.aspx>) states “residents are asked not to dig anywhere in the housing area” states that there is a “no digging” policy at JPHC.

Town Meetings—Town meetings were held regularly during the performance of the investigations at the site. Flyers providing notification of the meeting schedule were posted and issued to every residence. Navy representatives presented accomplishments and scheduled activities related to OU 3T JPHC during these meetings. The Navy held Restoration Advisory Board (RAB) meetings, town meetings hosted by the Commanding Officer, and meetings to address specific issues of public interest during the RI/FS. In addition, the Navy provided information concerning progress of investigation and clean-up activities in a housing complex newsletter. A partial list of the town hall and RAB meeting dates is provided below:

- September 2004 – RAB
- June and November 2004 – Town Hall Meeting – Phase 1 OU 3T JPHC
- January 2006 – Town Hall Meeting – JPHC Cleanup
- March 2007 – Town Hall Meeting – OU 3T JPHC Terrestrial Remedial Investigation
- September 2007 – RAB Meeting
- October 2007 and January 2008 – JPHC Newsletter articles
- June 2008 – RAB Meeting
- January 2009 – Town Hall Meeting – JPHC Cleanup
- May 2009 – Town Hall Meeting – JPHC Cleanup

4. SCOPE AND ROLE OF OPERABLE UNIT

The JPHC/NHB site has been divided into three separate operable units: OU 1, OU 2, and OU 3. The impacts to soils, sediments, and groundwater are being addressed under OU 1. OU 2 and OU 3 focus on the impacts to the former NAD Puget Sound site from MEC.

- OU 1 addresses human health risks from terrestrial chemical sources in soil and groundwater and ingestion of shellfish from Ostrich Bay. A ROD was prepared for OU 1 in August 2000 (Navy 2000).
- OU 2 addresses the potential chemical impacts to marine sediments in Ostrich Bay and any associated ecological risks to the marine environment. A supplemental RI/FS is in progress for OU 2.
- OU 3 addresses potential explosive hazards that may be present on former NAD Puget Sound property. The former NAD Puget Sound site has been further subdivided into OU 3T JPHC, OU 3T NHB, and OU 3M (Figure 1-2). This ROD only addresses OU 3T JPHC. The draft final RI/FS report has been completed for OU 3T NHB (TtEC 2010c). The RI/FS for OU 3M is currently under review.

OU 1 and OU 2 address the risks to human health and the environment from residual chemical contamination at the former NAD Puget Sound site. The potential explosive hazard to the public caused from contact with DMM items remaining at the site is being addressed by OU 3 (OU 3T JPHC, OU 3T NHB, and OU 3M).

4.1 OU 1 ROD Summary

The August, 2000 OU 1 ROD addressed all issues at JPHC/NHB except for subtidal ecological risk from possible contaminated sediments which are addressed under OU 2, potential explosive hazards associated with encounters with DMM items in the terrestrial portions of JPHC and NHB, which are addressed under OU 3T JPHC and OU 3T NHB, respectively, and the subtidal marine environment, which are addressed under OU 3M.

Under OU 1, the selected remedy for soil addresses human health risks posed by ingestion of soil and potential environmental risks posed by erosion of fill material into the marine environment. Surface soils containing inorganic and organic chemicals at concentrations greater than established cleanup levels have been covered with a clean soil cover to minimize the potential for human exposure. Shoreline areas have been stabilized to minimize the potential for erosion of fill material into the marine environment. The selected remedy also includes land use restrictions to prevent uncontrolled disturbance of subsurface soils containing inorganic and organic chemicals at concentrations greater than established cleanup levels and prevents residential development in the Elwood Point area.

The selected remedy for groundwater addresses potential chemical-related environmental and human health risks for lowland portions of OU 1 where groundwater is not a potential drinking

water source and for upland portions of OU 1 where groundwater may be a potential future drinking water source.

The selected remedy for marine tissue addresses potential human health risks posed by consumption of clams and crabs from Ostrich Bay. Wooden pilings that were a potential source of chemicals in marine tissue have been removed. Shellfish harvesting is restricted to limit human exposure to chemicals in shellfish. The selected remedy also includes monitoring of marine tissue to determine the need for continued shellfish harvest restrictions.

The first 5-year review of the OU 1 ROD was prepared in August 2005 (Navy 2005). The second 5-year review was submitted to EPA in February 2011.

4.2 OU 2 Summary

A draft FS is in preparation for OU 2. The FS incorporates data from a baseline ecological risk assessment (BERA) performed to characterize marine sediments in Ostrich Bay. The BERA provides a basis for determining if remedial action is necessary and provides the justification for performing remedial actions. The BERA identified contaminants of potential concern (COPCs) identified from sediment and aquatic biota samples collected in 2009. The COPCs include 15 metals, tributyltin (TBT), PAHs, polychlorinated biphenyls (PCBs), several semi-volatile organic chemicals (SVOCs), organochlorine pesticides, and 27 munitions constituents (MC).

The BERA presents risk estimates for benthic invertebrate, fish, and wildlife species that may be exposed to COPCs in sediments and aquatic biota at OU 2. Risks were estimated for the benthic invertebrate community, crabs, fish, birds, and mammals that may be potentially exposed to COPCs in prey or sediments at OU 2.

Risk estimates were found to exceed regulatory criteria or thresholds for metals only. For the benthic invertebrate community, sediment concentrations of mercury, aluminum, and selenium locally exceeded sediment quality standards (SQS) or sediment quality goals (SQG). Sediment toxicity tests were negative for all but one of the sediment sample locations in OU 2. Based on the risk estimates and toxicity testing combined, these results strongly suggest there are unlikely risks to the OU 2 benthic invertebrate community.

For crabs, fish, birds, and mammalian wildlife, arsenic, chromium, and mercury were identified as COPCs. However, these metals were identified in background sediment samples. Therefore, there is uncertainty in determining if these metals may cause impacts to crabs, fish, birds, or aquatic mammals.

None of the sediment concentrations in OU 2 exceeded the high end of sediment quality criteria or criteria for the lowest observed adverse level; therefore, ecological risks are considered either low or uncertain but unlikely for all ecological receptors at OU 2, including benthic invertebrates, crabs, birds, and mammals. The no adverse effect level criteria (NOAEL) for arsenic and chromium were exceeded in fish, crabs, and diving ducks. Exceedances of SQS and NOAEL-based criteria occurred for exposures to mercury for benthic invertebrates, diving ducks

(surf scoter), and river otter. The mercury exceedances are based on concentrations measured in sediment, clam tissue, and fish tissue from Ostrich Bay. Given these results from the BERA, there do not appear to be significant risks for the marine life and other receptors at OU 2 from past operations at NAD Puget Sound.

4.3 OU 3T and OU 3M Summary

OU 3 was developed to address potential residual explosives hazards related to encounters with DMM at the JPHC/NHB CERCLA site. This ROD addresses the OU 3T JPHC site, which is a residential site and differs from OU 3T NHB in that the latter site is an operating Navy base with no long-term residents. These two operable units are similar in that the Navy has developed LUCs that will remain in effect as long as the potential for exposure to residual MEC remains at these sites. The goal for OU 3M is to allow unrestricted use of Ostrich Bay in the future with LUCs limited to provisions of appropriate advisory and educational programs targeted at users of the bay.

The current status of the RI/FS projects at NHB and the marine unit is described below.

4.3.1 OU 3T NHB

An RI was performed at the approximately 50-acre OU 3T NHB site from October 2007 to May 2009. A 0.2 acre former trash-burning mound was discovered along the shoreline east of the hospital while conducting the RI and a TCRA was performed to remove canisters of an oxidizing material from the mound. The RI/FS report was finalized in September 2010 (TtEC 2010c). The RI focused on identification and removal of explosively configured DMM equivalent to a 20-mm or larger projectile. No DMM-HE items were found at NHB during the RI. Four DMM items containing pyrotechnic materials (DMM-Pyro) and three small arms cartridges (DMM-SA) were recovered during the remedial investigation and TCRA.

As part of the RI, a magnetometer survey of 100 percent of the accessible surface areas of NHB was conducted, 11,148 subsurface electromagnetic anomalies were identified, and 1,417 anomaly sites were excavated (more than 12.6 percent of the identified anomalies) to determine if DMM items were present at OU 3T NHB.

During the RI, a soil mound containing canisters of flashless pellets was discovered. Over 27,000 pounds of flashless pellets were removed from the mound. The flashless pellets were identified as an oxidizer (DOT/UN Class 5.1) and not an explosive and were transported to a permitted treatment facility where they were incinerated in December 2009. The TCRA was performed after discovery of this soil mound to remove the mound that could potentially contain DMM items. One DMM-Pyro was recovered from the mound; no DMM-HE items were recovered from the mound soils. Soils beneath the former mound footprint were also investigated and no DMM items were recovered.

No DMM-HE items were found on or below the ground surface during the RI. Therefore, the RI did not identify any locations within OU 3T NHB impacted by the contaminant of interest for the

remedial investigation (i.e., DMM-HE). A few DMM-Pyro or DMM-SA items were identified. These include two smoke markers, a 5.56-mm cartridge, and a 7.62-mm cartridge found at the ground surface and a .50-caliber cartridge found 6 inches below the surface within the fenced area of NHB. The .50-caliber cartridge was the only munition item located during the RI that was within an anomaly location identified during the electromagnetic survey of the site.

Remedial alternatives that are similar to alternatives proposed for OU 3T JPHC are being developed for OU 3T NHB. There is a significant difference in land use at NHB, as the site is a secure Navy base with limited access, and the remedial alternatives being developed reflect this difference.

4.3.2 OU 3M

OU 3M is adjacent to the JPHC and NHB property (Figure 1-2). Ostrich Bay is approximately 279 acres in an area designated as State Owned Aquatic Land. Phase 1 and Phase 2 of an RI and a pilot study to test multiple mechanical DMM removal and processing methods were conducted at OU 3M from October 2005 to November 2009. The remedial action objective (RAO) for OU 3M is the unrestricted use of the subtidal and intertidal areas of Ostrich Bay. The Navy has land use easements on 79 acres of Ostrich Bay, and the remaining 200 acres of Ostrich Bay is owned by the State of Washington and managed by the DNR. Also included in OU 3M are 50 acres of intertidal area located on residential private property on the southern and eastern shore of Ostrich Bay. OU 3M does not include the intertidal area at JPHC/NHB or the intertidal area associated with NAD Marine Park located south of JPHC.

Records from the 56-year operating history of the NAD indicate that some military munitions were lost during the loading and unloading of ammunition barges on Ostrich Bay. Although losses occurred throughout the bay, the majority of all DMM items found in the bay have been in close proximity to Piers 1 and 2 formerly used for munitions transfer. Geophysical surveys and ordnance recovery operations from 1981 to 2009, as well as the results of the OU 3M RI, indicate that additional DMM may remain in the marine sediment of Ostrich Bay, with the highest likelihood of occurrence in the area surrounding the piers.

The RI tasks included conducting geophysical surveys to map magnetic anomalies; conducting instrument-aided beach inspections on 35 acres of private land to determine the extent, if any, of DMM in the intertidal zone on the southern and eastern portions of Ostrich Bay; and carrying out diving operations to investigate and record the source of the magnetic anomalies within the bay. During the RI, 925 magnetic anomalies were selected for investigation by divers out of a total population of 1,185. The investigations found DMM at 26 locations outside the pilot study area. This is a DMM occurrence rate of less than 3 percent. At the completion of the RI, divers had recovered a total of 235 DMM items, of which 227 were DMM-HE. All the recovered DMM items were unfired and unarmed and considered to be insensitive to detonation from normal handling. Over 85 percent of the DMM items found in the bay at large were recovered from just two sites. During the RI, divers also recovered more than 3 tons of scrap metal from investigated anomaly locations.

The pilot study tested multiple mechanical DMM removal and processing methods and benchmarked the results against DMM recovery using only divers. Development of remedial alternatives and preparation of the RI/FS report for OU 3M are in progress.

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5. SITE CHARACTERISTICS

JPHC is on 186 acres (not including 46 acres of undeveloped intertidal area) in the southern part of former NAD Puget Sound and is a densely developed military housing area operated by the Navy. Development of the residential housing location began in 1965 and the most recent structures, a teen center and a drive-through pharmacy, were completed in 2006.

There are currently 530 structures on the JPHC site. Of these, 190 are residential housing, 11 are community buildings (day care center, community center, picnic gazebos, restrooms, etc.), 325 are carports/garages, and 4 are former magazines. Land use at OU 3T is shown on Figure 5-1.

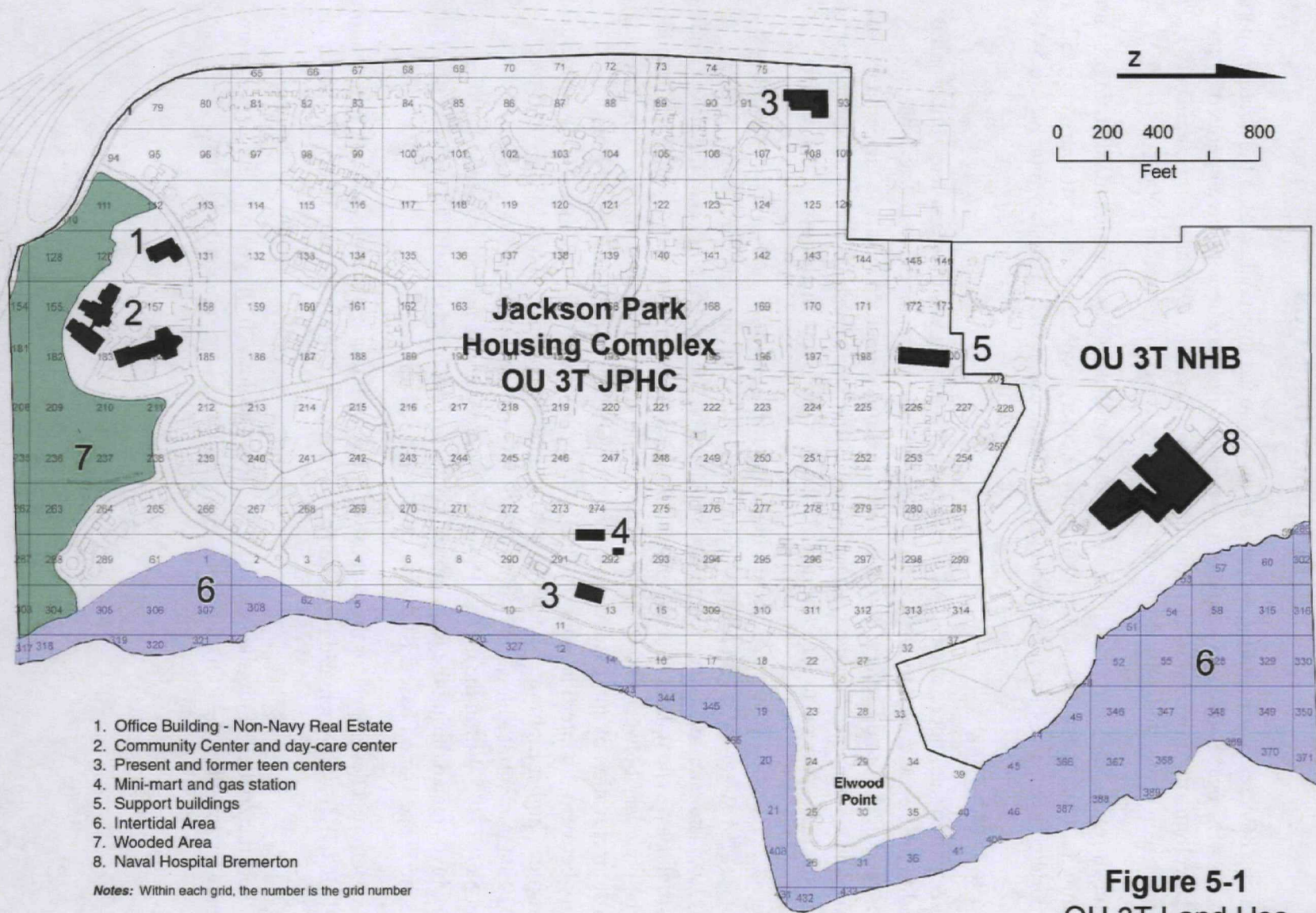
5.1 Physical Setting

JPHC lies within the Puget Sound Lowland that extends south from the Canadian border and is bounded to the east and west by the Cascade and Olympic mountain ranges. The lowland includes the Puget Sound Estuary, which is connected to the Pacific Ocean via the Strait of Juan de Fuca. The site is located on the western side of Ostrich Bay. Ostrich Bay is an appendage of Dyes Inlet, which connects to Puget Sound via the Port Washington Narrows and Rich Passage.

The OU 3T JPHC site occupies 232 acres, including the intertidal zone to 0.0 feet mean lower low water (MLLW) or -6.35 feet relative to the National Geodetic Vertical Datum of 1929 (NGVD29). The intertidal area encompasses 46 acres on the eastern portion of the site extending into Ostrich Bay. The upland area comprises 186 acres and slopes moderately upward from the bay. The boundary between OU 3T JPHC and OU 3T NHB in the northern part of the intertidal zone is at an elevation of approximately 4 to 8 feet NGVD29. South of Elwood Point, the boundary between the intertidal zone and the upland part of OU 3T JPHC is generally coincident with the mean higher high water line (MHHW) at an elevation of 12.0 feet MLLW (5.7 feet NGVD29). Land-surface elevation within JPHC ranges from sea level (0.0 feet NGVD29) to 180 feet NGVD29. Within the upland 186 acres, 60 acres are under roadways and buildings and were not investigated during the RI. Approximately 9 acres of OU 3T JPHC were investigated prior to the Phase 1 and Phase 2 RI during earlier site activities.

A grid system was developed for the purpose of the remedial investigations and site remediation at the JPHC/NHB site. Each grid is typically 200 feet square (40,000 square feet), as shown on Figure 5-1.

Physical characteristics of the site (such as hydrology, geology, hydrogeology, etc.) have been previously presented in the ROD for OU 1 (Navy 2000) and are summarized below.



5.1.1 Geology

Soils at the site belong to the Alderwood series developed on recessional silty sand deposits. This soil layer, combined with fill, represents the uppermost geologic layer. The surface soils are underlain by Vashon recessional outwash deposits ranging from 5- to 30-feet thick. This is the uppermost water-bearing unit at the site and comprises silty sands and gravels deposited by glacial outwash. The underlying Vashon Till consists of a dense fine-grained, low-permeability matrix of silt with gravel and cobbles. The thickness of Vashon Till in the upland area ranges from 10 to 20 feet, and this unit is unknown in the lower areas of the site. The till is underlain by the Vashon advance outwash deposits, a silty fine-grained sand up to 250-feet thick. The depth to bedrock at JPHC is not known.

5.1.2 Hydrogeology

Groundwater at JPHC includes a perched layer in the Vashon recessional outwash deposits, localized permeable zones within the Vashon Till, and a regional body in the Vashon advance outwash deposits. Groundwater movement is towards Ostrich Bay. The Vashon advance outwash deposits aquifer is an important regional aquifer tapped by numerous domestic and several municipal water supply wells, although none are known within 0.75 mile of the site.

Groundwater at the JPHC site was assessed during the OU 1 ROD. Groundwater at OU 3T JPHC is not used as drinking water or for any other use. A search of well logs shows only monitoring wells in the vicinity of JPHC (some other wells may be mislocated on logs and Ecology's system).

5.1.3 Hydrology and Water Supply

Surface water at JPHC occurs primarily as runoff from precipitation and lawn watering. Water that does not infiltrate the ground enters the storm sewer system and discharges to Ostrich Bay. Ostrich Bay is a navigable waterway and considered as Waters of the State of Washington.

There are two largely ephemeral streams that flow in culverts at JPHC. A stream near the community center in the southern portion of the site flows east into Ostrich Bay. A stream in the northwestern portion of the site flows north onto the adjacent NHB property. There are a number of seeps visible in the intertidal area at low tide. These seeps are representative of perched groundwater.

Drinking water for residents and visitors is provided by the City of Bremerton. Explosive hazards presented by potential MEC at OU 3T JPHC are not a contaminant of concern for groundwater. Chemical impacts from MEC were not included in the OU 3T JPHC RI/FS Report, and there is no anticipated migration pathway. Future uses of groundwater are not anticipated to be affected by OU 3T JPHC MEC that are the subject of this ROD.

It is anticipated that the site will continue to utilize existing City of Bremerton public water system for drinking water in the future. The City of Bremerton water sources are the Union River Reservoir approximately 5 miles southwest of JPHC and groundwater from production

wells located in the Bremerton area. All sources are managed in accordance with Washington State Department of Health, EPA regulations, and best management practices for water supply systems. The Bremerton water system serves about 55,000 people and the Bremerton Naval Complex. On average, the Bremerton Water Utility supplies about 8 million gallons each day.

5.1.4 Areas of Archaeological or Historical Importance

The JPHC site was divided into areas of high, low, and no probability for cultural or archaeological resources based on cultural resources surveys and discussions with the Suquamish Tribe (TtEC 2007b, 2007c). No cultural resource items have been encountered to date during investigations or removal actions.

The Suquamish Tribe considers Elwood Point a Traditional Cultural Property eligible for listing on the National Register of Historic Places. The Elwood Point Traditional Cultural Property defined by the Tribe includes the Elwood Point landform, associated intertidal environmental habitat on the landform margins, and offshore areas that were traditional fishing localities utilized by the Suquamish People over the past 1,000 years. There is a shell midden on Elwood Point and this area is excluded from investigation to protect that resource.

Based on input from the Suquamish Tribe, important cultural resources on the Elwood Point landform retain integrity of condition, location, setting, and feeling and association for contemporary Suquamish People. The U.S. Navy removed most industrial structures from Elwood Point, restoring the property to conditions similar to those when the landform was used by the Suquamish Tribe in pre-contact times and during the early historic period.

Cultural significance of the site to the Suquamish Tribe is not limited to Elwood Point or the intertidal area. Ostrich Bay is considered a cultural and a subsistence resource for the Suquamish Tribe for the harvest of fish and shellfish. Ostrich Bay is also part of the Suquamish Tribe's usual and accustomed areas as provided for in the 1855 Treaty of Point Elliott. Currently, Ostrich Bay is under advisories issued by the Kitsap County Health District (Health District). For information on this advisory, see Section 6.2.3.

5.2 Conceptual Site Model

The Conceptual Site Model (CSM) is graphically presented in Figure 5-2 and focuses on the explosive hazards of munitions that may be potentially present at the site, relative to the safety of residents, visitors, and workers.

5.2.1 Primary Sources

The former NAD Puget Sound property was purchased in 1904. NAD Puget Sound began operations in 1908 and was decommissioned in 1959. A variety of munitions were assembled at the site and additional munitions were brought to the site for storage, refurbishing (rework), and demilitarization. As summarized in Section 2.1, the most common items at the site were 20-mm projectiles, 40-mm projectiles, 5-inch projectiles, 14-inch projectiles, and 14-inch bag charges.

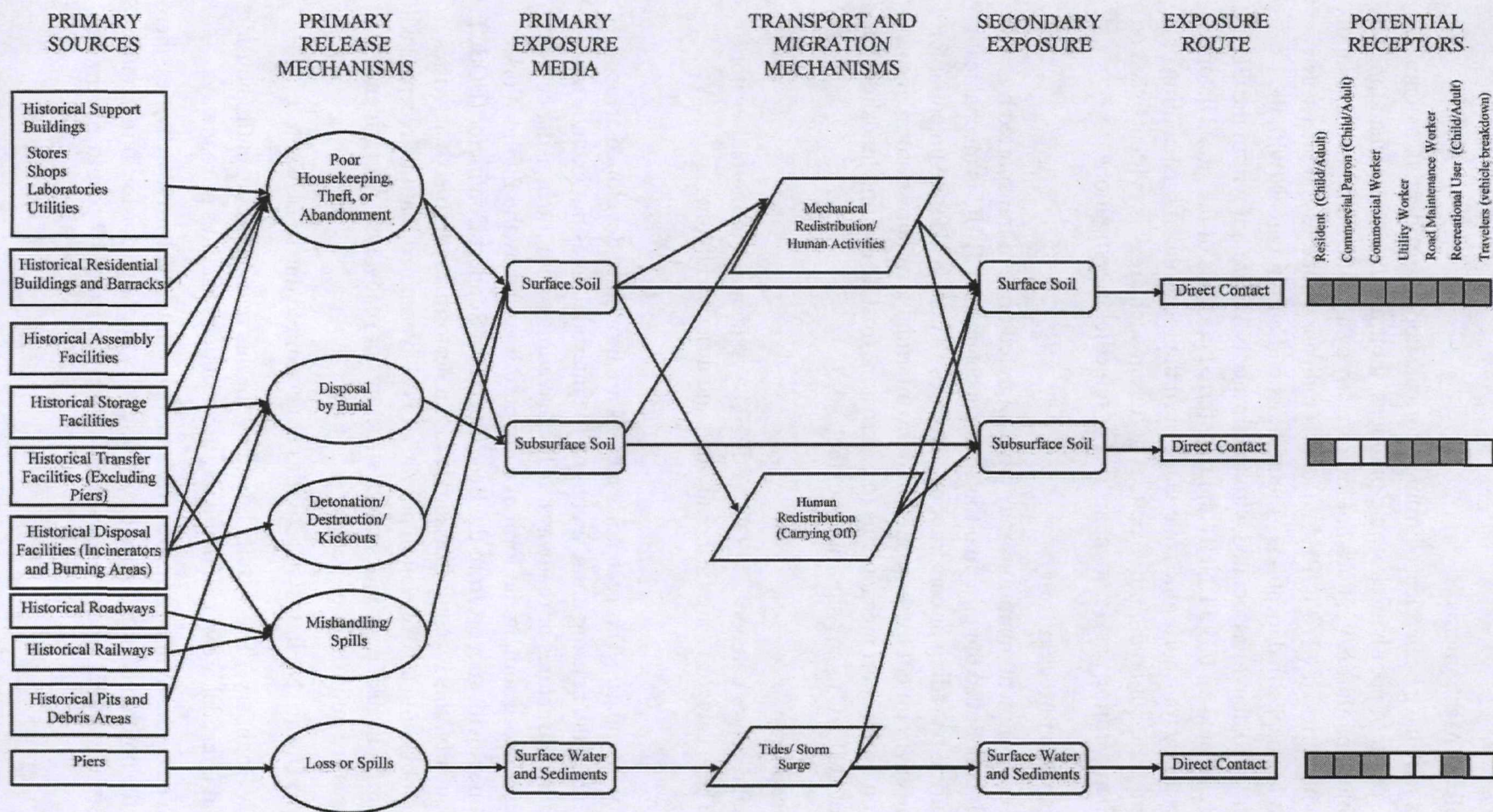


Figure 5-2. Conceptual Site Model

5.2.2 Potential Release Mechanisms

Historically, munitions may have been released from historical support, residential, assembly and storage facilities as the result of poor housekeeping practices, theft, inadvertent mishandling, or abandonment. Available site information does not indicate any systematic burial or disposal of munitions within the boundaries of OU 3T JPHC. Reports indicate smokeless powder was burned along the beach in unspecified locations. Incinerators and burning areas (with the exception of those mentioned above) associated with the former NAD are not within the OU 3T JPHC boundary, but are located on OU 3T NHB and transferred portions of the site. Historical transfer facilities and primary transport routes may have been the locations of mishandling or loss events in the upland area, but no definitive pattern of loss in such areas is evident based on an analysis of data gathered during past removal actions or remedial investigations.

5.2.3 Potential Transport Mechanisms

Once released into the environment, munitions may have migrated or been transported by various mechanisms. It is believed the principal transport mechanism at JPHC is mechanical redistribution of soil during regrading or construction activities. There is also the potential for munitions in the marine environment to be washed into the intertidal area during storm events. Other possible migration or transport mechanisms (e.g., erosion, frost heave, and landslides) do not appear to be evident at JPHC to any significant extent.

5.2.4 Potential Receptors

There are three potential receptor categories at OU 3T JPHC—residents, commercial visitors, and Tribal members. These categories are further divided and described below:

Residents

Adults Activity Boundary: This receptor's actions are limited to developed areas surrounding the housing units, including the intertidal areas but exclude any areas under structures or roadways. All excavation within the housing complex requires authorization in the form of a dig permit issued by the Public Works Department with support from the Base Operation Support Contractor (BOSC). Consequently, this receptor is assumed to not perform any intrusive activities without obtaining an excavation permit. It is also assumed that this receptor will not perform intrusive activities under structures or roadways. All residential structures are built slab-on-grade.

Intrusive Depth: No intrusive activities are permitted due to LUCs.

Children Activity Boundary: The activity boundary for this receptor is the entire housing area and intertidal areas, excluding any areas under structures or roadways.

Intrusive Depth: While there are LUCs that prohibit all intrusive activities, there is still the potential for children to recreationally dig (e.g., for forts) in wooded areas or in intertidal areas. Depths are not likely to exceed 2 feet in either area.

Site Visitors **Activity Boundary:** The activity boundary for this receptor is similar to that of the adult and child receptor combined, depending on the age of the visitor. There is the potential for site visitors to not be as familiar as residents with the LUCs and, therefore, participate in intrusive activities. These intrusive activities would likely be significantly less frequent and of shorter duration.

Intrusive Depth: There is limited potential for this receptor to perform intrusive activities to a depth of 2 feet on infrequent occasions.

Shellfish Harvesters (recreational) **Activity Boundary:** The activity boundary for this receptor is limited to the intertidal areas of OU 3T JPHC and the transportation routes to and from the intertidal areas. Currently, there is a Health District advisory (see Section 6.2.3 for information regarding the shellfish harvesting advisory) in effect to prevent shellfish harvesting at OU 3T JPHC due to chemical contamination. This advisory is expected to be in effect until all site remedial actions have been completed.

Intrusive Depth: The shellfish harvester may dig 2 feet into sediments.

Commercial Visitors

Construction Workers **Activity Boundary:** This receptor performs intrusive activities associated with construction of new facilities or maintaining existing facilities. There is the potential for this receptor to perform intrusive activities under existing foundations, sidewalks, and roadways. It is presumed that these activities occur in areas where the subsurface has not been significantly disturbed. As stated above, all intrusive operations require obtaining an excavation permit.

Intrusive Depth: This receptor has the potential to perform intrusive operations to 4 feet to set building foundations, and potentially deeper for other construction activities.

Utility Workers **Activity Boundary:** This receptor's actions are primarily within existing utility corridors in developed housing areas and the shoreline recreational area. Areas under roadways are included. It is assumed these areas have been significantly disturbed in the past and, in some cases, backfilled with off-site materials.

Intrusive Depth: This receptor has the potential to occasionally perform intrusive activities to a depth of 10 feet (sewer lines). More commonly, the intrusive depth would be less than 4 feet. Excavation (dig) permits are required for this activity as for all excavation activity conducted within the housing complex.

Day Care Children and Adults **Activity Boundary:** There are two groups of receptors in this category – children and adults.

Children: This receptor's activities are limited to accessing the site via a vehicle, in most cases, playing in enclosed play yards at the center, spending time in the day care center building, and taking escorted walks along the sidewalks around Jackson Park. All activities the children are involved with are closely supervised by day care providers. They do not perform intrusive activities.

Adults: This category includes day care providers who are at the site for a standard work shift (approximately 8 hours) and parents/guardians who use public transportation routes to and from the day care center. Day care providers do not perform intrusive operations and have little to no exposure to subsurface soils. Parents/guardians use public transportation routes to gain access to the site.

Note: Children and parents/guardians who live at JPHC will be addressed under the residential categories for their non-day care activities.

Intrusive Depth: These receptors are not likely to perform intrusive operations at JPHC.

Tribal Members

Site Visitors **Activity Boundary:** Historically, the areas of greatest Tribal interest and activity at the site have been along the shoreline and at Elwood Point. However, the cultural significance of the site is not limited to Elwood Point or the intertidal area. The Elwood Point Traditional Cultural Property includes the Elwood Point landform, associated intertidal environmental habitat on the landform margins, and offshore areas that were traditional fishing localities utilized by the Suquamish People over the past 1,000 years.

Intrusive Depth: This receptor is unlikely to perform any intrusive actions while at the site.

Shellfish harvesters (subsistence) **Activity Boundary:** The activity boundary for this receptor is limited to the intertidal areas of OU 3T JPHC and transportation routes to and from the intertidal areas where the Tribal Members have treaty rights for harvesting shellfish and other marine animals. Currently, there is a Health District advisory (see Section 6.2.3 for information regarding the shellfish harvesting advisory) in effect to prevent shellfish harvesting at OU 3T JPHC due to chemical contamination. This advisory is expected to be in effect until all site remedial actions have been completed.

Intrusive Depth: The subsistence harvester may dig 2 feet into sediments.

5.2.5 Potential Exposure Pathways

Exposure pathways are typically incomplete for all receptors. LUCs prohibit ground-disturbing activities at JPHC, unless an excavation permit is obtained prior to conducting any operation requiring digging by residents, contractors, and visitors.

Construction and utility workers that regularly perform excavation activities are more likely to have complete exposure pathways; however, surface clearance of metallic items at JPHC, implementation of munitions training for contractors, and the requirement that contractors obtain excavation permits before conducting ground-disturbing activities have reduced the potential for completion of the exposure pathways. Construction and utility workers also have the potential to work in areas where surface clearance and geophysical data collection have not been performed (e.g., under roadways and buildings). It has been determined that the potential to encounter munitions during utility maintenance in existing utility corridors is very low due to the level of past ground-disturbing activities. Data gathered during the RI indicates a very low potential for encountering DMM in areas of the site that have been previously investigated. In addition, areas of the site that have not been investigated, but have been previously disturbed through development (e.g., roads, buildings, etc.) also are believed to have a low potential for encountering DMM.

The scope of OU 3T is potential explosive hazards associated with contact to DMM. OU 3T does not include chemical exposure assessments for exposure to chemically impacted soils and/or groundwater. Soil and groundwater exposure pathways for chemical constituents are addressed in OU 1 and OU 2.

5.3 DMM Investigations Summary

As a result of previous DMM-related investigations, removal/remedial actions, or construction support activities, more than 50,000 separate anomaly locations have been investigated on site. Surface clearance of all DMM items from accessible areas of the site has been completed. The investigation coverage and results are summarized in Table 5-1.

The 16 items in Table 5-2 represent the full extent of DMM recovery on site. The results are segregated based on whether or not the item contained HE. Locations of DMM recovered during Phase 1 and Phase 2 RI work are shown in Figure 2-2.

There were no areas identified as possible DMM dump or burial sites in the upland or intertidal zone at JPHC. It is believed that all of the DMM items in the uplands and the fuzes, projectiles, and cartridge casing found in the intertidal zone originated from operations at NAD Puget Sound. No specific age of the items could be determined, but they were not in new condition.

Table 5-1. DMM Investigation Coverage and Results

Investigation or Removal/Remedial or Oversight Action	Approximate Area Included	Anomaly Locations Investigated	Metallic Items Removed	DMM with HE	DMM without HE	Pounds of Scrap
Pre-Remedial Investigation	25 statistically chosen sub-grids	Surface clearance + >500		0	1	Not tracked
OU 1 ROD	11 grids	143 + soil screening	Not tracked by item	0	0	69,390
TCRA	9 acres	2,475 + soil screening		4	0	
Phase 1 RI	All accessible areas, 153 acres	38,303	27,660	6	1	22,640
Phase 2 RI	Selected anomalies from all grids	9,460	23,913	2	3	15,833

Notes:

Soil screening involved MEC oversight of excavations as well as processing scraped soil through a screening plant.

DMM – discarded military munitions

HE – high explosives

OU 1 – Operable Unit 1

RI – remedial investigation

ROD – Record of Decision

TCRA – time-critical removal action

Table 5-2. DMM Recovery to Date

Grid	Item Description	Contains HE? (Yes/No)	Location	Year Recovered	Project Phase
40	40-mm projectile with HE filler	Y	Subsurface-Intertidal	2007	Phase 2 RI
49	Illumination candle with parachute	N	Subsurface-Intertidal	2007	Phase 2 RI
54	Marine marker initiator	N	Subsurface-Intertidal	2007	Phase 2 RI
166	40-mm round; no visible fuze; suspect propellant inside case	Y	Subsurface-Upland	2007	Phase 2 RI
327	20-mm cartridge casing with propellant; projectile broken off at rotator band	N	Subsurface-Intertidal	2007	Phase 2 RI
274	40-mm projectile	Y	Surface-Upland	2003	Phase 1 RI
274	1-pounder projectile	Y	Surface-Upland	2003	Phase 1 RI
252	Signal flare	N	Surface-Upland	2003	Phase 1 RI
227	5-inch projectile base fuze	Y	Surface-Upland	2003	Phase 1 RI
18	5-inch projectile base fuze	Y	Surface-Intertidal	2003	Phase 1 RI
9	5-inch mechanical time fuze	Y	Surface-Intertidal	2003	Phase 1 RI
1	5-inch projectile base fuze	Y	Surface-Intertidal	2003	Phase 1 RI
61	Mk XI-3 projectile nose fuze	Y	Subsurface-Upland	2001	TCRA
24	40-mm projectile with HE filler	Y	Subsurface-Upland	2001	TCRA
14	1-pounder projectile	Y	Subsurface-Upland	2000	TCRA
5	5-inch/38 projectile base fuze	Y	Subsurface-Intertidal	2000	TCRA

Notes:

HE – high explosive

mm – millimeter

RI – remedial investigation

TCRA – time-critical removal action

The illumination candle and marker initiator found in the intertidal zone are flare components. These items may be found in areas of significant marine vessel traffic in Puget Sound and may not necessarily be associated with operations at NAD Puget Sound. The ages of these items are uncertain.

The Navy/EPA project team established a value of 0.00025 as a low DMM-HE incidence rate (DMM-HE per anomaly) in the April 2006 Joint Resolution Statement and subsequent agreements. Two subsurface DMM-HE items were recovered from the 23,913 metallic anomalies from the 9,460 anomaly locations during Phase 2, resulting in a "low" incidence rate of 0.00021. The DMM recovery rate was 0.000084 DMM- HE item per metallic item recovered.

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6. CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

JPHC has been a military housing development for over 45 years and it is anticipated to remain as such in the future.

6.1 Current Land Use

The 232-acre JPHC site includes both upland and intertidal areas that are used for a combination of residential, recreational, and commercial purposes.

6.1.1 Residential Land Use

Over 500 military personnel along with more than 1,300 dependents currently live at JPHC. Approximately 80 percent of the residences are occupied by the families of enlisted personnel, and the remaining residences are occupied by officers' families. Residents typically remain at JPHC for between 2 and 10 years.

6.1.2 Recreational Land Use

The recreational component is composed of the shoreline recreational area, including play courts (tennis, volleyball and basketball), a children's play structure, a picnic area, bike/walking path, and softball field. In addition to the shoreline recreational area, there is a youth center for indoor activities, several play courts, and small child play structures located throughout the housing area.

6.1.3 Commercial Land Use

Commercial activities at the site are limited to the Mini Mart, a convenience store with four gas pumps.

6.1.4 Current Adjacent/Surrounding Land Uses

Figure 1-2 shows the current uses of the former NAD Puget Sound Site. NHB is north of OU 3T JPHC and is a Navy base that supports the medical mission of the DoD. To the east of OU 3T JPHC lies Ostrich Bay which includes OU 3M JPHC. Ostrich Bay comprises approximately 279 acres, including approximately 79 acres of state-owned property on which the Navy enjoys land use easements on the west side of the bay. Portions of the northern, western, and southern areas of the former NAD Puget Sound have been transferred to the City of Bremerton for NAD Park, NAD Marine Park, and Jackson Park Elementary School; to the State of Washington for Route 3; and to private developers for the Erlands Point Apartments.

6.2 Land Use Controls

The current LUCs for JPHC are detailed in the NBK Instruction 8020.1A (Navy 2008). The program includes both a MEC awareness program and an on-call construction support program in the form of EOD MU 11 Det. Bangor response to any report of an encounter with a potential

DMM item. Both aspects of the program are intended to protect site residents, workers, and visitors from potential exposure to DMM.

The MEC awareness program consists of many types of educational materials (DVDs, brochures, posters, coloring books, site history acknowledgement forms) intended to raise the awareness of potential to encounter DMM, the hazards associated with such encounters, and the proper reporting and notification procedures to be followed in the unlikely event of such an encounter at the site. Some of these materials are also disseminated regularly or are posted in numerous public gathering sites at JPHC so that they reach a very broad audience. All contractors conducting ground-disturbing activities at the site are required to view the DVD and acknowledge understanding its content as part of the process of obtaining dig permit approval at the site. All residents are required to view the video and acknowledge understanding its content as a condition of occupancy in the housing complex. The information presented is simple and concise: what hazards might be present; why they are present; where they are present; and what should be done if DMM are encountered.

6.2.1 MEC Oversight Requirements Under NBK Instruction 8020.1

Prior to 2003, MEC oversight at ground-disturbing activities had not been established at JPHC. A munitions hazard assessment was performed in 2002 to combine historical data on building uses, building locations, historical roadways and railroads, topography, and probable disposal areas to determine potential munitions-related hazards at the site. The study was based primarily on historical knowledge of past operations at NAD Puget Sound and limited data on the location of munitions items found prior to the Phase 1 surface clearance and Phase 2 intrusive investigation. In the absence of field generated investigative data, the assessment used conservative assumptions on the degree of hazard and the likelihood of encounter with DMM items at the site. Based on these conservative assumptions, the initial assessment indicated the site had a medium-to-high MEC hazard level (Foster Wheeler 2003).

Based on the initial hazard assessment, the initial construction support program at JPHC was conservative and included a requirement for MEC construction oversight during intrusive construction activities. MEC construction oversight was provided beginning in 2003 prior to initiation of the formal requirement in July 2004 under NBK Instruction 8020.1. When NBK Instruction 8020.1 was implemented at JPHC and NHB, the preliminary assessment of the site had been completed (Foster Wheeler 2002e) and the Phase 1 investigation was in progress. There had been no systematic investigation of subsurface MEC at JPHC. There are no records of a hazardous incident or near incident related to an encounter with DMM due to ground-disturbing activity prior to 2003 or since that time.

Under the provisions of NBK Instruction 8020.1, between 2003 and 2007, more than 1,700 hours of on-site construction oversight was provided by qualified UXO technicians at the JPHC and NHB sites, with more than 270 hours of construction oversight over 55 events at JPHC. In no instance was any DMM-HE item encountered during any of the projects at JPHC. The data

gathered during this construction oversight supports a conclusion that encounters with DMM items at the site during ground-disturbing activities is unlikely.

6.2.2 Current MEC Oversight Under NBK Instruction 8020.1A

In June of 2008, based on a comprehensive review by the Naval Ordnance Safety and Security Activity (NOSSA) of all available information related to explosive safety management at the site, as required by DoD 6055.09-STD (DoD 2008), local instructions regarding LUCs at JPHC were revised and NBK Instruction 8020.1A (Navy 2008) was issued. This instruction eliminated the requirement for on-site UXO qualified technician oversight during ground-disturbing activities at JPHC and was implemented during construction in 2008.

Since NBK Instruction 8020.1A was issued, construction work has continued in support of operation of JPHC. Construction projects at JPHC included replacement of more than 5 linear miles (greater than 26,000 feet) of a gas line. The work was conducted without on-site MEC oversight under current LUC provisions. No discovery of any potential DMM item was reported during this project or any other construction project undertaken since the implementation of LUCs to address explosive hazards at JPHC. Extensive road repair, water line installation, and other ground-disturbing activity have also been conducted at the site without report of encounters with potential DMM.

On-site MEC construction oversight support has not provided demonstrable benefit at JPHC due to the proven very low likelihood of an encounter with potential DMM. The munitions managed by NAD Puget Sound were not fired; therefore, fuzes in the munitions were not armed. The explosive hazard associated with unfired and unarmed munitions is low, because safety mechanisms inherent in fusing remain in place making it unlikely that such items would detonate as a result of inadvertent impact during construction activity.

With respect to the future structure of the construction support, DoD 6055.9-STD, Chapter 12 allows for establishing on-call construction support based on a determination of the probability of an encounter with MEC. A quantitative definition of "low" probability is not provided in the standard. NOSSA, with subsequent approval by Department of Defense Explosives Safety Board (DDESB), has made a determination, based on professional judgment and in consideration of all available relevant information concerning the site, that there is a low incidence of MEC at the site and that the explosive safety risk at the site is low provided a program of MEC awareness is provided. Based on the NOSSA and DDESB determinations, NBK Instruction 8020.1 was cancelled, eliminating the requirement for on-site construction oversight by fully qualified UXO technicians. In its place, Instruction 8020.1A was issued, allowing for continued maintenance of education and awareness programs and on-call response and oversight of construction activity when a potential DMM item is encountered.

The current LUCs identified in NBK Instruction 8020.1A include maintaining the education and awareness program for residents, visitors, and contractors that may engage in ground-disturbing activities and providing information on the procedures to be followed in the event of

encountering a DMM-HE item. The LUCs include providing information on the history of the site, results of munitions investigations that have been conducted at JPHC, basic MEC identification, reporting procedures, and precautionary measures. Excavation (dig) permits are required to be obtained in advance of excavation work. The LUCs also include record keeping, annual monitoring to ensure compliance with the LUCs, annual review of the education and awareness program, and annual reporting.

6.2.3 Shellfish Harvesting

Based on data collected during the OU 3T JPHC Phase 2 RI, the likelihood of an encounter with potential subsurface DMM in these intertidal areas is low (consistent with the likelihood of an encounter in the upland areas). One item classified as DMM-HE was found in the intertidal area during Phase 2 of the RI. This item was a corroded and unfired and unarmed 40-mm projectile. Two additional items found in the intertidal area (parachute flare and marine marker) could be expected to be found anywhere along the shoreline of Puget Sound waterways where significant boat traffic occurs and are unlikely to be associated with operations of former NAD Puget Sound. The last DMM item found was an inert 20-mm practice round. Based upon the data available, evidence suggests that allowing shellfish harvesting in the future in intertidal areas of the site would result in a low likelihood of an encounter with DMM-HE.

Besides concerns related to explosive hazard from potential presence of DMM, there is a current contaminant-based advisory concerning commercial and recreational shellfish harvesting on the western shore of Ostrich Bay (including JPHC intertidal areas). The shellfish advisories were originally issued by the Health District in 1969. This advisory currently aims to prevent shellfish harvesting by commercial, recreational, or tribal harvesters due to recurring nonpoint pollution from pollutants such as sewage, oil, and chemicals that run off the land into the bay during heavy rainfall events. Because it is difficult to predict when these periods might occur, the Health District currently considers this an ongoing rather than periodic advisory. The Health District information on this advisory; can be found on the Health District website¹.

In addition, monitoring of tissue in clams and crab in Ostrich Bay is ongoing as part of the OU 1 ROD and for marine sediments as part of the RI/FS process being undertaken for OU 2. Data from these actions will, in part, help determine the need for further shellfish harvest restrictions (see Sections 4.1 and 4.2); however, responsibility for the ongoing advisory being lifted ultimately rests with the Health District. Consequently, the remedial alternatives evaluated to effectively manage explosive safety hazards associated with potential future shellfish harvesting in the JPHC intertidal area may not, by themselves, result in removal of all restrictions that currently prohibit shellfish harvesting.

The Tribe expects to have full and unrestricted use of the intertidal area as part of their usual and accustomed harvest area in the future once physical and chemical hazards are mitigated and the advisories are lifted. In addition, the Navy recognizes the importance of Elwood Point to the

¹ http://www.kitsapcountyhealth.com/environmental_health/water_quality/shellfish_closures.htm.

Tribe as an area of cultural significance. The Navy has acknowledged the Tribe's right to conduct subsistence harvesting of shellfish in the intertidal areas of the site within the usual and accustomed fishing area. The remedial alternatives described in this report include consideration of this potential future land use.

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7. SUMMARY OF SITE RISKS

The exposure hazard and contaminant of concern addressed at OU 3T JPHC is the potential explosive hazard from DMM. DMM may be present as a result of the site's past history as NAD Puget Sound. No armed or fired munitions have been found at the site, and none of the other munitions-related items found have been classified as UXO, which would pose a higher explosive safety hazard than DMM-HE.

There is no regulatory standard that defines the acceptable quantitative minimum exposure level for DMM-HE. The goal is to eliminate all potential contact with the DMM items; however, a variety of technical and practical factors make attaining such a goal with absolute certainty impossible. In the absence of a qualitative model for defining explosive hazards at the site, site hazards are described on a qualitative basis.

7.1 Explosive Hazard Assessment

The future land use for upland areas of JPHC is projected to be residential in nature with the Navy continuing to manage the facility to provide housing for military members and their dependents. Under this future land use, the upland areas of JPHC would be subject to residential land use that may include intrusive activities for:

- Landscaping and yard maintenance;
- Construction or repair of structures;
- Construction, repair, or maintenance of infrastructure (roads, utilities, etc.); and
- Renovation, demolition, and construction of housing and ancillary support facilities as necessary to support continued operation of the housing complex.

While shellfish harvesting is currently not permitted by Health District advisory, the intertidal area of Ostrich Bay will be a potential shellfish harvesting and recreational area for JPHC residents and for subsistence or commercial harvesting by members of the public and the Suquamish Tribe. The remedial action alternatives were constructed on the basis of these projected land uses and associated activities.

The interim MEC HA Guidance (EPA 2008) was used to evaluate OU 3T JPHC using data from the RI. The explosive hazard assessment is the functional equivalent of a risk assessment for chemical contamination. The MEC HA identified the site as having low explosive potential hazards.

The MEC HA evaluates explosive hazard for surface and subsurface exposure strictly on the basis of whether or not a 100 percent clearance effort has been successfully performed. The surface clearance was completed for 100 percent of the accessible areas of the site; therefore, a decrease in risk was realized. However, the MEC HA is not suited to consider the degree of confidence associated with statistically based DMM removal actions (i.e., the Phase 2 RI). The results of the Phase 2 RI demonstrate a low subsurface DMM incidence rate at the site with a

high degree of statistical confidence, which is consistent with the MEC HA Low Hazard Category score.

NOSSA also performed a hazard assessment of the site as part of its review of available data concerning explosive hazards at the site as required by the DoD Ammunition and Explosives Safety Standards (DoD 2008). NOSSA and the DDESB determined there is a low incidence of MEC at the site and that the explosive safety risk at the site is low, provided a program of MEC awareness is maintained.

The low subsurface DMM incidence rate was determined by NOSSA. DoD 6055.9-STD, Chapter 12.4.3.2.1.1, addresses "low probability" and states that:

A "low" determination may be assigned to those areas for which a search of available historical recorded and onsite investigation data indicates that, given the military or munitions-related activities that occurred at the site, the likelihood of encounter with MEC or CA [chemical armament], regardless of the CA configuration, is low.

By project team agreement, the explosive hazard for grids where no recovered DMM-HE were found during the Phase 2 OU 3T JPHC RI/FS is presumed to be effectively managed under the existing LUCs as of November 2006 for the current Navy-owned and-operated military residential complex. The LUCs in effect in November 2006 were the July 8, 2004, NBK Instruction 8020.1 (Navy 2004) that included on-site MEC avoidance supervision for intrusive activities. Following NOSSA's hazard assessment and DDESB review, Instruction 8020.1 was cancelled. MEC avoidance support for intrusive activities was eliminated from the LUCs currently in place for JPHC (NBK Instruction 8020.1A, June 18, 2008). The current LUCs are described in Section 6.2 of this ROD.

7.2 Ecological Risk Assessment

The OU 3T JPHC RI/FS was conducted to determine if DMM poses an unacceptable explosive hazard to human receptors. An ecological risk assessment was not performed for this operable unit, but such assessments are part of the OU 1 and OU 2 evaluations for the JPHC/NHB site.

Potential risks to the environment during implementation of remedial actions at OU 3T were evaluated as part of the selection of the preferred remedy.

There are several endangered or threatened species found in the area of OU 3T, including several protected species, such as bald eagles. However, based on the results of the Biological Evaluation, Jackson Park Housing Area, Ostrich Bay, Metal Debris Removal Operation (Navy 2007) conducted for the Phase 2 RI; no threatened or endangered species are anticipated to be present in the project area based on past surveys and current listings in any of the areas evaluated in the RI. Therefore, all remedial alternatives are likely to have no effect. While noise is a consideration for bald eagles and their nesting young, it is also anticipated that the levels of noise from operating equipment during Alternative 2, if selected, will not impact bald eagles or their

nests due to proximity of eagles and their nests to Highway 3 traffic noise versus the relative lesser degree of noise associated with the alternatives.

The intertidal area along Jackson Park can be considered essential fish habitat (EFH) for salmonids and groundfish (Navy 2007). The excavations for DMM removal along the shoreline (intertidal areas), if the Alternative 2 grid clearance alternative is selected, are likely to have a temporary effect to the substrate habitat, and it is anticipated that the substrate will recover within several months to a year. With the exception of Alternative 2B, it is anticipated that all remedial alternatives for this project would have no effect on EFH. Alternative 2B (100 percent intertidal clearance) could temporarily have a moderate to substantial effect on EFH and substrate habitat.

7.3 Basis for Action

The data from the RI and evaluation of the residual explosive risk at the site indicate there is a low explosive hazard remaining at JPHC. Section 14 of the Navy's Naval Sea Systems Command (NAVSEA) OP-5 (2009) states that it is not possible to remove MEC from a site with 100 percent certainty; therefore, these sites will pose some degree of residual risk. The response action selected in this ROD is necessary to protect public health or welfare or the environment from encountering explosively configured DMM at the OU 3T JPHC site, which may present an imminent and substantial endangerment to public health or welfare.

July 28, 2011

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8. REMEDIAL ACTION OBJECTIVES

RAOs were developed for JPHC to protect human health and the environment in consideration of the reasonably anticipated future land uses. The RAOs consider the contaminants and media of concern, exposure routes and receptors, and acceptable contaminant levels. In the case of DMM-HE, there is no chemical "contaminant level" that is typically a basis of action or a remedial action objective at other CERCLA sites. Instead, the RAO is based on the potential for exposure to explosive DMM and subsequent contact with DMM causing injury or mortality. The RAO for OU 3T is to allow use of the site for residential housing (upland) and the intertidal areas (including recreational, subsistence, and commercial harvesting of shellfish).

LUCs are evaluated to support overall RAOs for the site for some alternatives. For these alternatives, the LUC objectives are:

1. Minimize the explosive hazard from potential encounters with DMM with HE at the site by requiring munitions education and awareness training for all residents as well as personnel involved in ground disturbing activities at the site (e.g. construction personnel).
2. Ensure excavation permits for all ground-disturbing activities conducted in the upland areas (i.e., areas above mean high-high tide) are obtained prior to initiation of work at the site.

8.1 Future Land Uses

There are two future land uses for OU 3T JPHC. Both land uses are based on continuing Navy ownership of the upland and intertidal portions of the JPHC site. The current and anticipated future land use for OU 3T JPHC is use of the upland areas as a Navy-owned facility operated for the purpose of providing housing and ancillary support facilities for military families. This will be accomplished by continuation of the current Navy management and contractor-supported operation of the housing and ancillary support facility areas. The Navy operates and manages the residential housing complex and associated facilities through a BOSC. The BOSC is contractually responsible for meeting the Navy's operational requirements for management of the housing complex, including implementation of explosive safety LUCs associated with day-to-day operations of the housing complex (i.e., administering dig permit programs, etc.).

The Navy considers a necessary component of any remedy to address explosive safety hazards at the site to include a continued education, awareness, and notification program. The objective of this program is to widely distribute information on the site's past history as an ammunition depot and inform the public, as well as any contractors performing ground-disturbing activities, of proper procedures to be used in the event of encountering a potential DMM item.

The intertidal area is adjacent to the upland area of the site currently occupied by Navy housing and ancillary support facilities. Residents of the housing area may access the intertidal area without restriction for recreational purposes. Currently, shellfish harvesting in the intertidal areas is not permitted and is under advisory from the Health District due to potential

bacteriological contamination and/or chemical contamination. The reasonably anticipated future land use for the intertidal area includes unrestricted shellfish harvesting by the Suquamish Tribe or the general public if the existing shellfish consumption advisory and harvesting advisory is lifted in the future. For the purposes of remedial alternative analysis for OU 3T JPHC, the objective is to eliminate or minimize shellfish harvesting restrictions associated with potential exposure to DMM in these areas.

8.2 Contaminants of Interest

As agreed to by the project team during development of the RI work plans, the contaminant of interest is an explosively configured item (DMM items with HE) equivalent to a 20-mm projectile or larger.

8.3 Media of Concern

For this OU 3T JPHC ROD, the principal media of potential concern relative to explosives safety are the surface and subsurface soils and intertidal sediments. The exposure route of concern for the future site users is direct contact with any potentially energetic munitions that may be present.

9. DESCRIPTION OF ALTERNATIVES

The RI/FS Report (TtEC 2010a) presented an FS remedial alternative analysis for three distinct alternatives to address potential explosive safety hazards from munitions. During meetings following finalization of the RI/FS Report, the need for evaluation of an additional remedial alternative was identified to support selection of a preferred remedy and proposed plan. This additional alternative (Alternative 3C) was included in the addendum to the RI/FS Report (TtEC 2010b).

9.1 Description of Remedy Components

The alternatives that were evaluated in the FS include the following:

9.1.1 Alternative 1: No Further Action (NFA)

This alternative is required by the CERCLA process and provides a baseline for comparison of the other alternatives. The NFA alternative assumes no additional regulatory-driven activities or steps would be taken to locate, remove, or dispose of any potential DMM, MPPEH, or non-munitions scrap. The NFA alternative also assumes that the existing baseline LUCs (including the education/awareness programs and dig permit process) for NHB would be discontinued.

Regardless of the NFA alternative, there is an existing DoD requirement to maintain emergency response, including emergency response by EOD MU 11 Det. Bangor for emergencies, including a reported discovery of suspicious items including DMM. This emergency response is maintained by the Navy through a mutual aid agreement and contract with Kitsap County Central Communications (CENCOM) via the 911 system land line or cellular telephone. CENCOM will direct response to Navy Regional Dispatch and or public service response as indicated by the nature of the call and will include notification and response by Navy EOD personnel as required.

The NFA alternative described above is not wholly implementable for OU 3T JPHC because NOSSA and DDESB have imposed a requirement that a program of munitions education and awareness is believed to be a necessary component of any remedy aimed at managing potential explosive safety hazards at the site.

9.1.2 Alternative 2: Anomaly Excavation

Under Alternative 2, anomaly excavation in selected areas of OU 3T JPHC (Figure 9-1) would occur to potentially decrease the remaining number of DMM-HE at the site, and provide a greater degree of certainty that the future likelihood of an encounter with DMM-HE at the site is low. Anomaly acquisition and removal methods; MEC, DMM, and metallic scrap handling and disposal methods; and reporting methods that were used in the RI would be used in conducting Alternatives 2A, 2B, and/or 2C described below.

- **Alternative 2A**—Excavation of approximately 1,100 remaining anomalies in 3.6 acres containing 3 upland grids (166, 227, and 234) where 4 DMM-HE items were located during the RI (Figures 9-2 to 9-4). Based on data from the Phase 2 RI, it is unlikely that

any additional DMM-HE items would be encountered during the removal of 100 percent of detected subsurface anomalies in these upland grids. In the event that additional DMM-HE items are encountered, the boundaries of the area being considered for anomaly removal under this alternative would be expanded.

- **Alternative 2B**—Excavation of approximately 17,000 remaining anomalies in 100 percent (42 acres) of the intertidal zone bounded by the MHHW and MLLW lines where four DMM-HE items were located during the RI (Figure 9-1). A geotextile fabric along the upland side of the JPHC intertidal-upland boundary extends approximately 1,500 feet from grids 7 to 18 and approximately 800 feet from grids 35 to 49 on the upland side of the MHHW line (Foster Wheeler 2002d). No excavation outside of the intertidal area in grids with geotextile is planned in order to preserve the geotextile. Based on statistical analysis of investigative data gathered to date, approximately four DMM-HE items are projected to be recovered during execution of Alternative 2B.
- **Alternative 2C**—Under this alternative, a more limited removal of anomalies in the intertidal area would occur as compared to Alternative 2B. Excavation of approximately 550 remaining anomalies in 5.3 acres containing four intertidal grids where DMM-HE was located during the RI (Figures 9-5 to 9-8). The geotextile is present in grids 9, 10, 17, 18, 19, 35, 39, 40, 44, and 45; therefore, there will be no intrusive investigation west of the upland-intertidal boundary in these grids. The north and south investigation grid boundaries will be 100 feet north and 100 feet south of the DMM-HE northing coordinate. Based on statistical analysis, it is estimated that one DMM-HE item may be found in this area. Based on statistical analysis of investigative data gathered to date, one DMM-HE item is projected to be recovered during execution of Alternative 2C.

Removal of additional detected metallic anomalies may be undertaken in grids investigated in Alternative 2A or 2C depending on whether additional DMM-HE are located relative to the decision unit (i.e., investigation areas centered on DMM-HE found during the RI) boundaries.

9.1.3 Alternative 3: Institutional Controls Combined With Engineering Controls

Under Alternative 3, institutional controls (education and awareness and excavation permits) combined with various engineering controls (LUCs) would continue to be implemented as described in Section 6.2. Components of Alternative 3 share the following assumptions:

- There is a low potential explosive safety hazard at JPHC based on data showing a low DMM incidence at the site and the nature of DMM found to date at the site (i.e., no range-related use at the site, and all DMM items found to date were unfired and unarmed).
- Much of JPHC has been regraded, excavated, and contoured to support the construction of the existing road and utility network, Navy housing units, and other buildings. Based on the lack of reports of encounters with DMM items during this development, it is assumed that DMM incidence in these areas is low (consistent with the remainder of the site).
- For the purposes of the alternative analysis, it is estimated that this program will continue for 50 years.

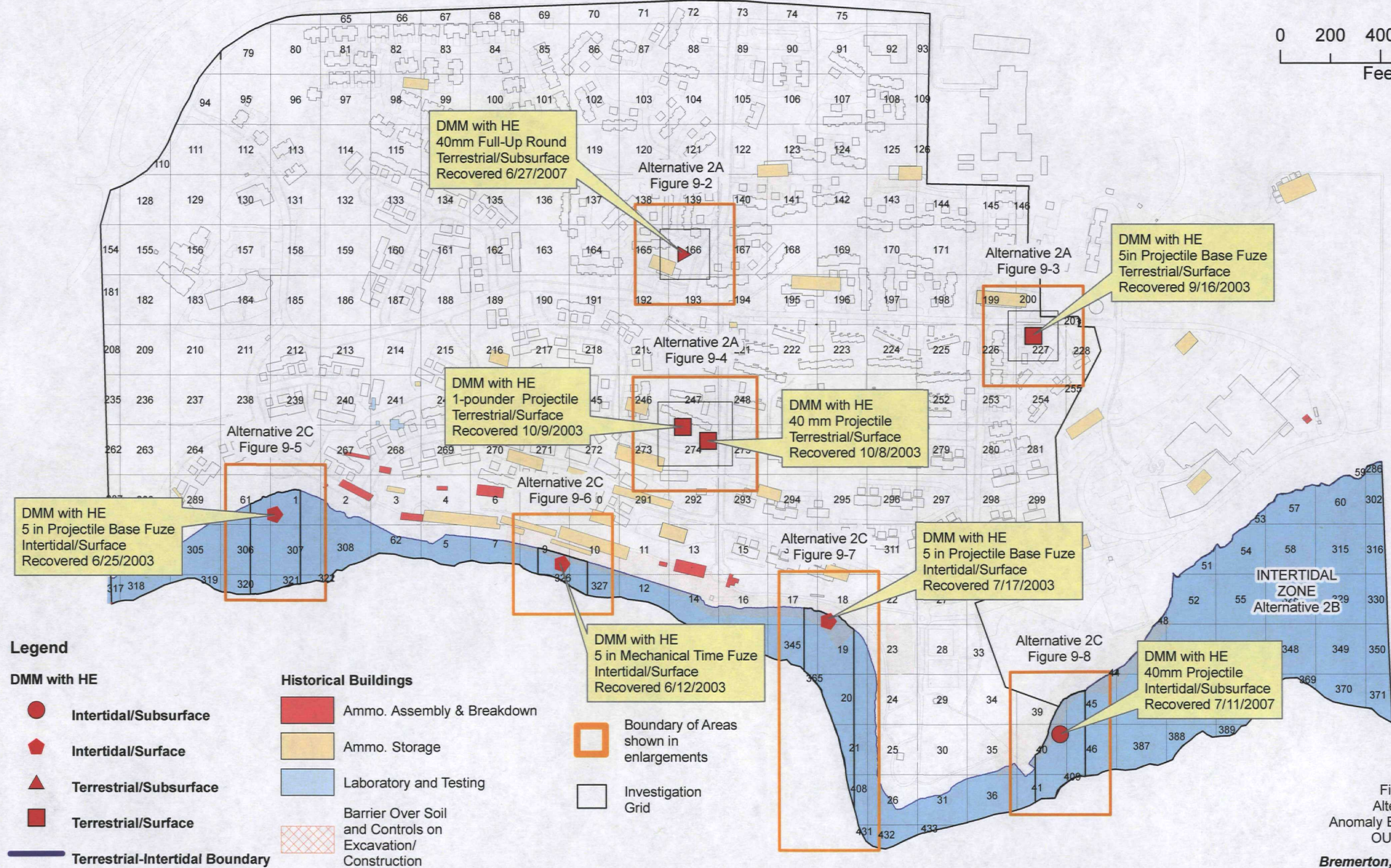
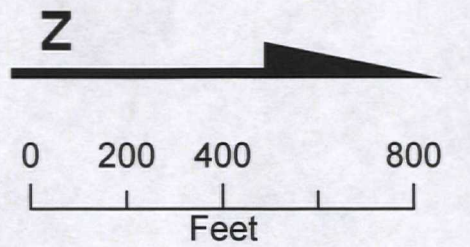
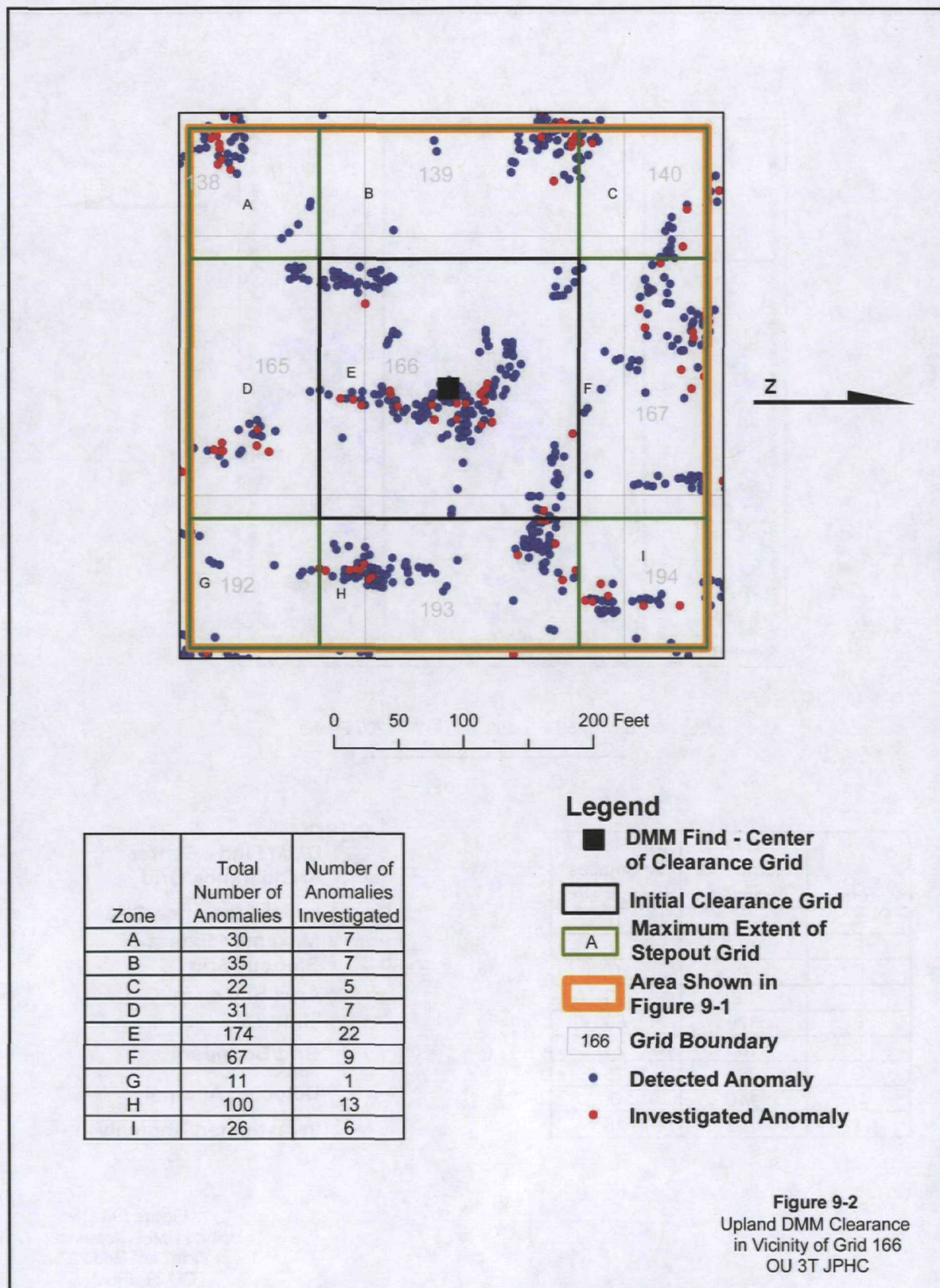
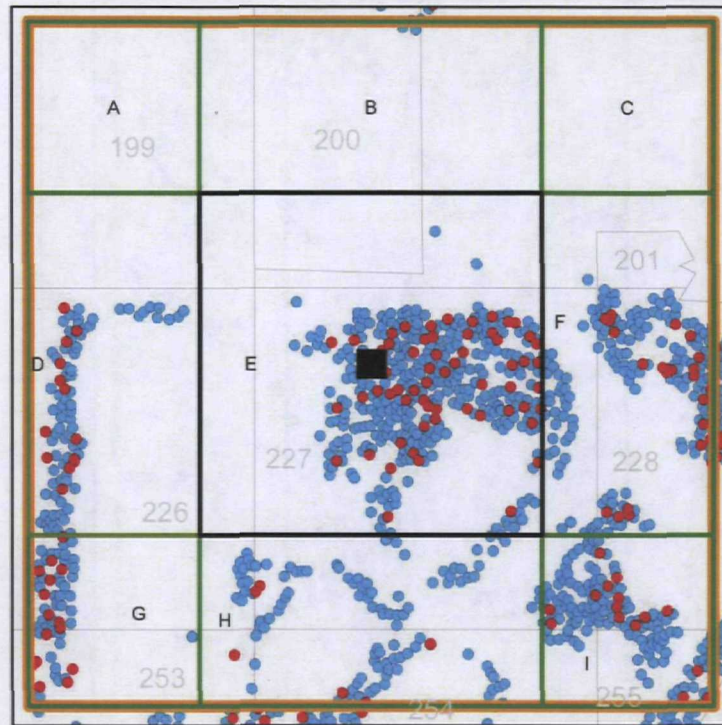


Figure 9-1
Alternative 2
Anomaly Excavation Areas
OU 3T JPHC
Bremerton, Washington





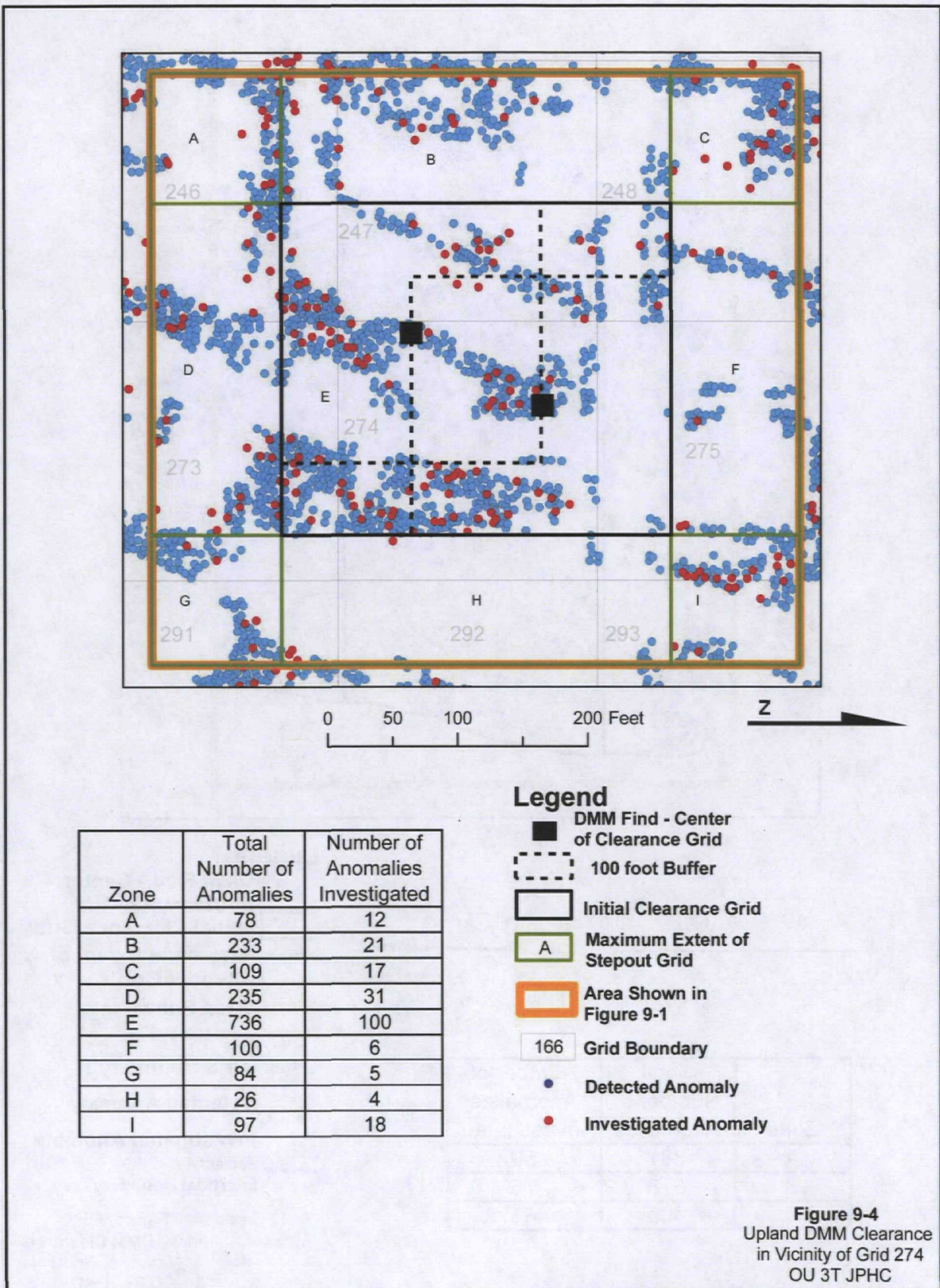
0 50 100 200 Feet

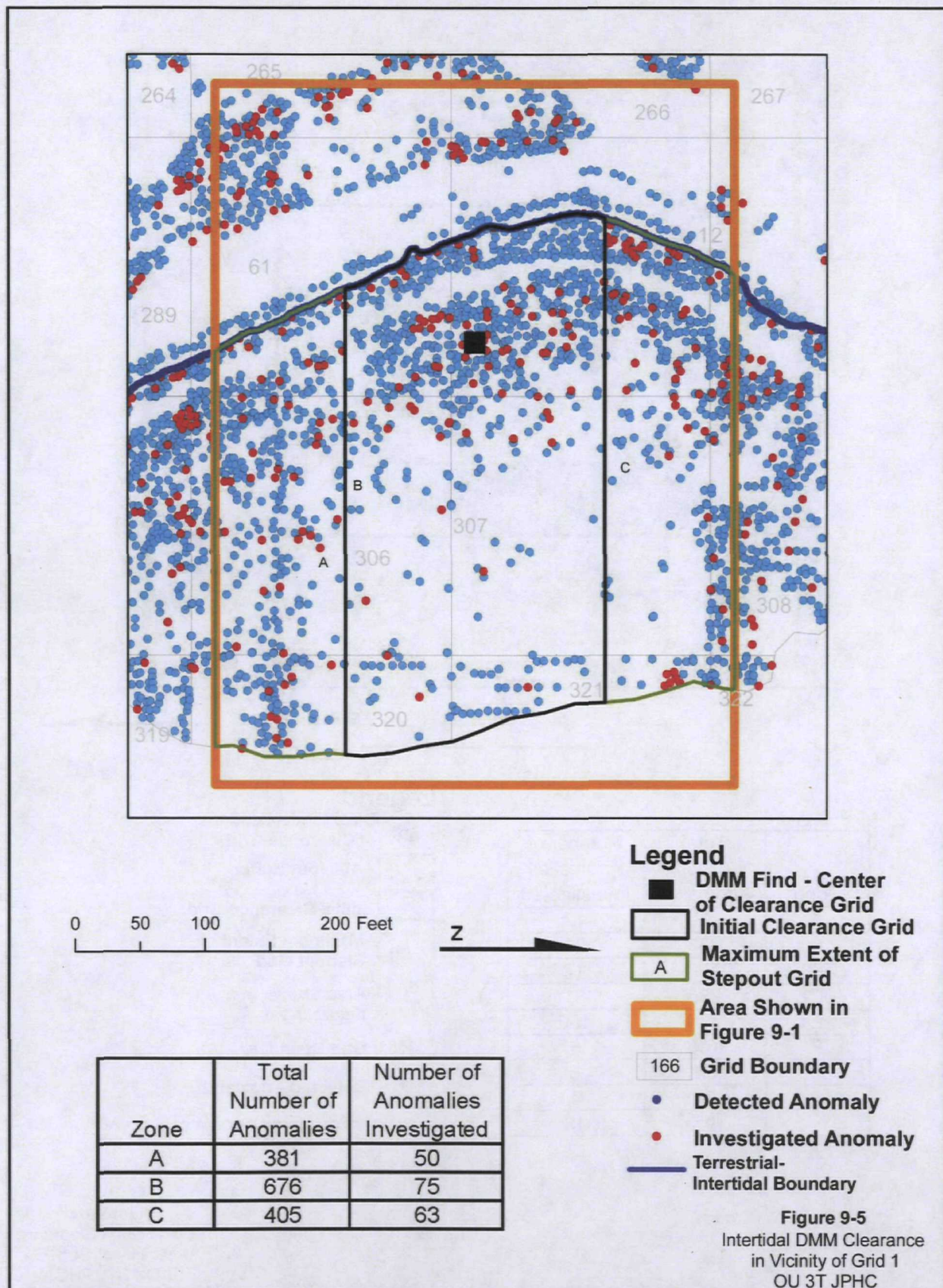
Zone	Total Number of Anomalies	Number of Anomalies Investigated
A	0	0
B	2	0
C	0	0
D	82	13
E	379	60
F	185	23
G	55	15
H	110	6
I	149	16

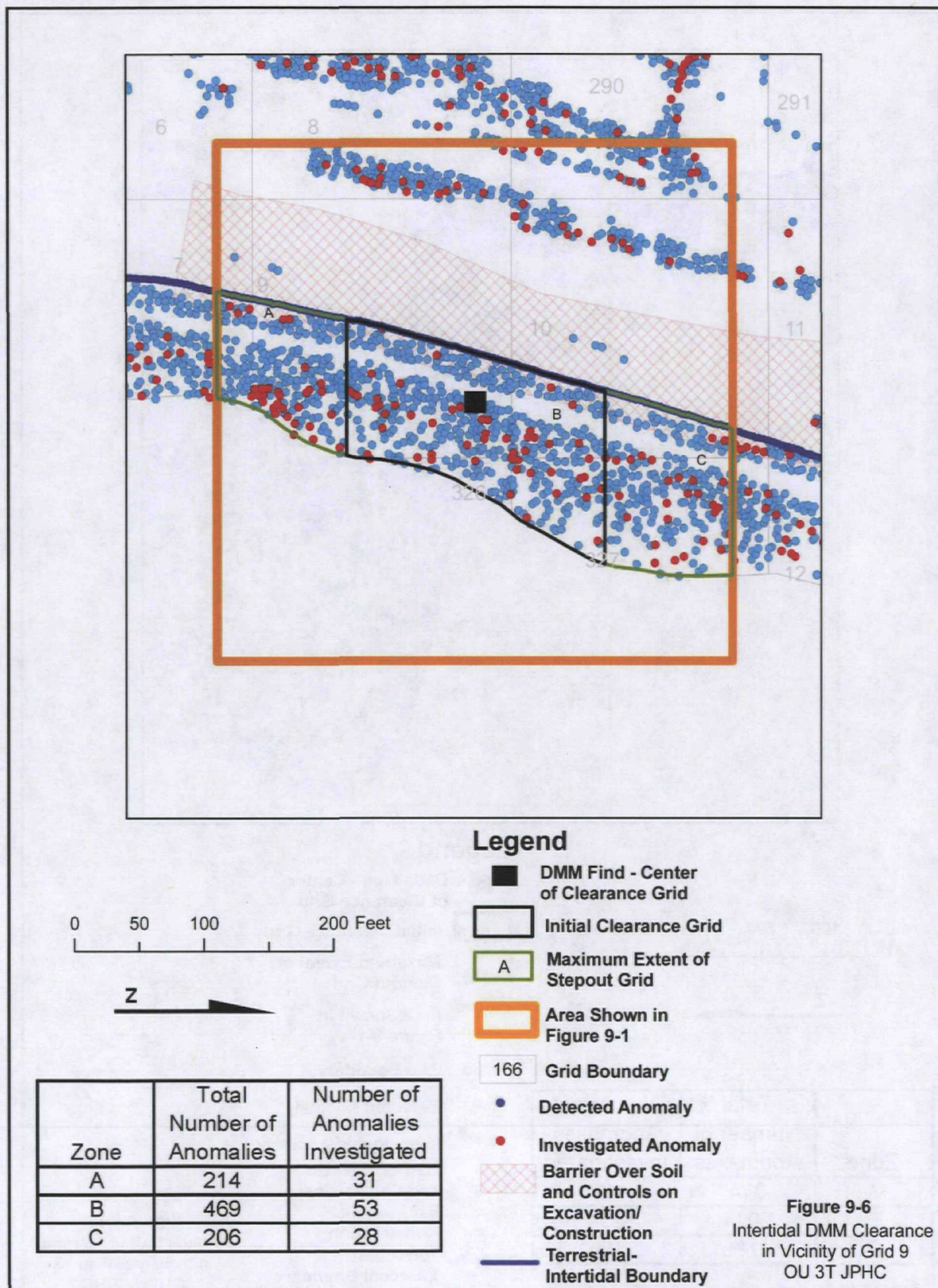
Legend

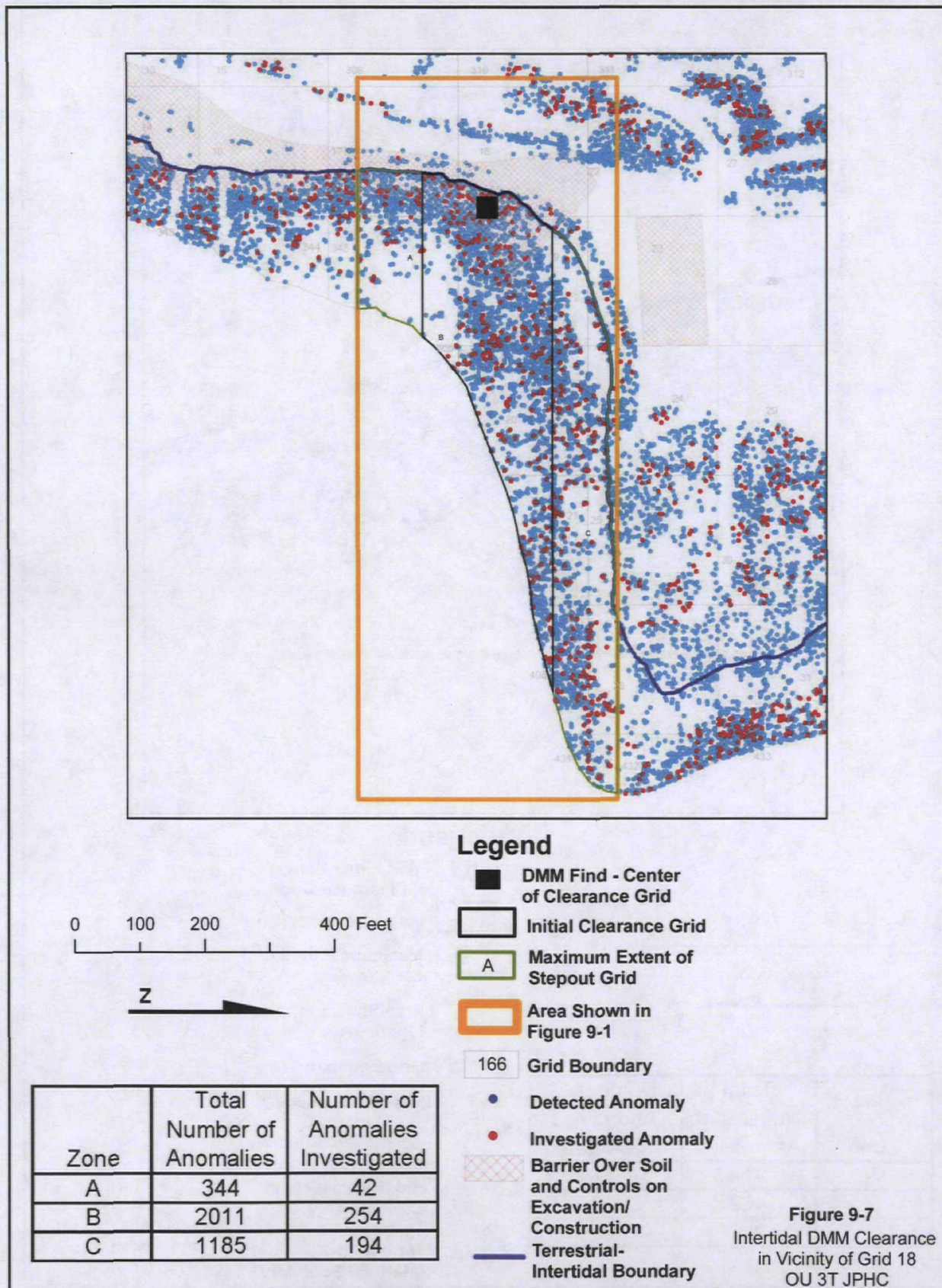
- DMM Find - Center of Clearance Grid
- Initial Clearance Grid
- Maximum Extent of Stepout Grid
- Area Shown in Figure 9-1
- 166 Grid Boundary
- Detected Anomaly
- Investigated Anomaly

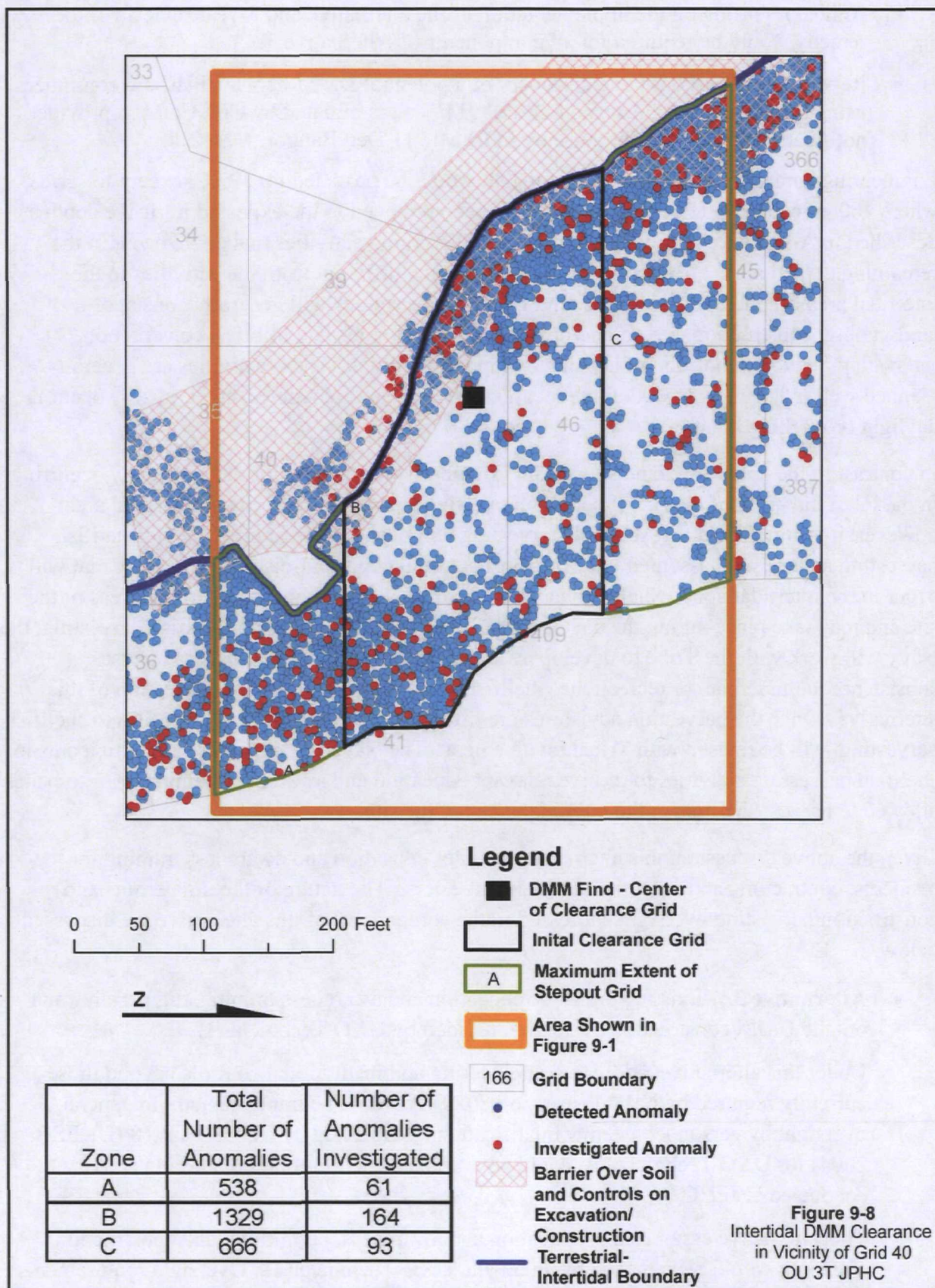
Figure 9-3
Upland DMM Clearance
in Vicinity of Grid 227
OU 3T JPHC











- Annual reporting on the implementation of the alternative and 5-year reviews of the remedy would be required for all components of Alternative 3.
- Reporting and response to a discovery of a potential DMM item at JPHC are continued using the 911 system. A response to a "911" call is initiated by CENCOM to provide notification and on-site response by EOD MU 11 Det. Bangor.

Engineering controls via construction oversight would be provided for JPHC, except for grids where 100 percent of detected anomalies have been removed to the expected intrusive depth as described in Alternative 2. The types of ground-disturbing activities that could occur in the remaining upland areas are expected to be significantly different from the activities in the intertidal area. In the upland area, ground-disturbing activities will generally consist of landscaping; construction, repair, and/or maintenance of roads and utilities; construction, renovation, and/or demolition of housing or support facilities. These activities are generally planned well in advance; have definite locations, scopes, and schedules; and typically occur in daylight or working hours.

In contrast to the upland area, no significant ground-disturbing activities are currently occurring in the intertidal areas of the site. Shellfish harvesting is not permitted in the intertidal area; however, it is anticipated that shellfish harvesting will occur in the future. Should shellfish harvesting resume, it is assumed to be the most significant ground-disturbing activity that will occur in the intertidal zone. Shellfish harvesting would occur within the intertidal areas of the site and may take place during the day or night. In anticipation of future shellfish harvesting, the Navy will work with the Tribe to develop awareness training that specifically addresses subsistence, commercial, or recreational shellfish harvesting activities upon selection of this alternative. Once the harvesting advisories are lifted, the education program specific to shellfish harvesting, will be revised with Tribal involvement. The Navy would require all participants in shellfish harvesting activities to receive relevant education and awareness training prior to being allowed to harvest shellfish in the intertidal areas of the site.

Given the above discussion, this alternative includes education and awareness training for the residents, contractors, and potential shellfish harvesters. The nature of the dig permits and construction/harvesting oversight addressed in the components of this alternative are discussed below.

- **Alternative 3A**—Existing ordnance education and awareness training, dig permits, and on-site DMM construction oversight provided by UXO Technician II.

Under this alternative, additional engineering and institutional controls beyond those currently required by NBK Instruction 8020.1A would be implemented. In general, oversight by personnel meeting qualifications established by DDESB TP-18 (DDESB 2004) for UXO Technician II would be evaluated for all ground-disturbing activity conducted at JPHC.

This alternative assumes that education and awareness, permitting, and construction oversight would be managed by an on-site UXO Technician II. Oversight requirements

would not be imposed for those areas of the site where 100 percent of detected anomalies have been removed to the expected intrusive depth as described in Alternative 2. Ground-disturbing activity in all other areas of the site would be assumed to require qualified UXO technician oversight sufficient to provide oversight at all locations where such activity occurs. UXO technician oversight under this alternative is assumed to consist of a qualified technician providing visual oversight of excavation activity. As is currently the case under existing LUCs, dig permits would be required for intrusive operations at JPHC.

Alternative 3A(1)–Upland Area. Qualified UXO technician support would be required on site to deal with utility maintenance, landscaping, road improvements, etc., that occur on a frequent and recurrent basis. For larger ground-disturbing activity (e.g., demolition and construction of existing buildings, major road construction, utility improvements) an additional compliment of qualified UXO technicians would be required to maintain oversight of all concurrent ground-disturbing activity.

Alternative 3A(2)–Intertidal Area. During shellfish harvesting periods, to provide support in areas that have not had 100 percent clearance of DMM-HE, an additional UXO Technician IIs would provide support to the intertidal area. Alternative 3A(2) would not be implemented in intertidal areas where remedial actions are conducted under Alternative 2B or 2C (i.e., complete clearance of anomalies in intertidal areas).

- **Alternative 3B–Existing ordnance education and awareness training, dig permits, and on-site DMM construction oversight provided personnel with site specific training provided as part of a basic ordnance education and awareness program.**

On-site construction oversight would be provided by personnel who have received site specific training (ordnance education and awareness) related to the site history, basic recognition of potential DMM, and procedures to be followed in the event of an encounter with a potential DMM item. This level of site-specific and/or task-specific training is currently required under NBK Instruction 8020.1A. This training is not intended to meet any formal qualifications specified by DDESB TP-18.

This alternative uses existing engineering and institutional controls currently required by NBK Instruction 8020.1A (Navy 2008). This alternative assumes that education and awareness training (i.e., training for residents and contractors not performing major construction projects), permitting, and construction oversight would be managed by NBK personnel that have received the basic site-specific ordnance education and awareness training, with support from the JPHC operations contractor. If a potential DMM-HE item is encountered during ground-disturbing activity, response would be provided by EOD MU 11 Det. Bangor. For shellfish harvesting, the Navy would require all harvesters to receive ordnance education and awareness training as a condition of access to the Navy-owned intertidal area. This training would be specifically focused on shellfish harvesting and would be developed in collaboration with the Tribe.

- **Alternative 3C**—The existing munitions education and awareness training (basic training) as described under Alternative 3B for all residents and contractors conducting routine maintenance and operation of the housing complex. The existing education and awareness training program with minor modification would be used (i.e., viewing the existing video on the subject, provisions for educational materials and signage as appropriate). In contrast to the upland areas, no significant ground-disturbing activities are currently occurring in the intertidal areas of the site. Shellfish harvesting is currently not permitted in the intertidal area; however, it is anticipated that shellfish harvesting will occur in the future. Should shellfish harvesting resume, it is assumed to be the most significant ground-disturbing activity that will occur in the intertidal zone. Shellfish harvesting would occur within the intertidal areas of the site and may take place during the day or night. In anticipation of future shellfish harvesting, the Navy will work with the Tribe to provide awareness training consistent with what is provided to residents and contractors. The Navy would require all participants in shellfish harvesting activities to receive relevant education and awareness training prior to being allowed to harvest shellfish in the intertidal areas of the site.

Under this alternative, enhanced explosive safety management and munitions recognition training would be provided to key personnel with responsibilities for managing and oversight of the excavation permitting program and projects requiring ground-disturbing activity. Personnel responsible for managing the excavation permit program who had received this explosive safety management and munitions recognition training would also be responsible for managing the basic ordnance education and awareness program.

The enhanced explosive safety management and munitions recognition training program would be provided to key personnel responsible for managing and supporting the excavation permitting process or providing oversight of some aspect of ground-disturbing activity at the site. The Public Works office responsible for managing the excavation permit process, the JPHC operation and maintenance contractor personnel responsible for supporting the excavation permit program, engineering technicians responsible for providing oversight at projects that require ground-disturbing activity, and other contractors responsible for major maintenance and/or demolition activity, and others deemed appropriate would be required to have expanded training. The expanded training is expected to consist of an ordnance recognition and awareness course that is designed to train participants in identification of potential explosive hazards, recognition of MEC, and response actions to be taken on discovery of MEC. This training would be provided in a classroom and field setting and is envisioned to include simulation of potential DMM encounters as part of the training. Periodic refresher training would be required to ensure training for these personnel is updated. This heightened degree of awareness provides an additional measure of protectiveness by ensuring that potential encounters with DMM are responded to properly, thereby reducing the likelihood that such items will be removed from the site by unauthorized personnel.

9.2 Key ARARs Associated With Each Alternative

The alternatives were evaluated to determine compliance with contaminant-specific laws and regulations such as the Clean Water Act, Clean Air Act, RCRA, and Washington Model Toxics Control Act (MTCA) and guidance documents from the DoD. All of the alternatives will meet these requirements.

Location-specific requirements are included in the Endangered Species Act, Washington Shoreline Management Act, Migratory Bird Treaty Act, National Historic Preservation Act, and Executive Order 11990 (Protection of Wetlands). The Navy will comply with these requirements and not seek a waiver.

Action-specific regulations, such as Washington's Transportation of Hazardous Materials and Hazardous Waste Management Acts, relate to the transportation of potentially hazardous items. No waivers would be needed for compliance with these regulations.

With the exception of Alternative 1, all of the proposed alternatives comply with ARARs and To Be Considered (TBC) items identified for OU 3T JPHC. Navy policy requires continuation of the existing awareness and education program for residents, visitors, and contractors; therefore, Alternative 1 is not compliant with this policy, which is a TBC for the site.

9.3 Long-Term Reliability of Remedy

Limitations of current subsurface detection and discrimination technology prevent 100 percent removal of all potential DMM items. Consequently, none of the alternatives can guarantee that the explosive hazard from the site will be totally eliminated following remedy implementation. Alternative 1 and the other alternatives manage the potential hazard through the existing emergency response system for potential encounters with DMM. To the extent additional DMM-HE items are removed, Alternative 2 will reduce the potential explosive hazard in specific areas through the excavation and removal of existing anomalies. Alternative 3 manages potential explosive hazards through continued use of LUCs, the excavation permitting process, and munitions education and awareness training. Parts of Alternative 3 contained in the existing LUCs for JPHC have been effectively implemented.

9.4 Quantity of Untreated Waste and Treatment Residuals

None of the alternatives can guarantee that the explosive hazard from the site will be totally eliminated following remedy implementation and there is no practical way to quantify remaining DMM. However, data gathered from prior investigations and response actions demonstrate that the likely volume of DMM-HE remaining at the site is low. In addition, as this site is and will be under future Navy control, mechanisms such as 911 emergency response and construction oversight/dig permit process remain in place to report and manage finds that may occur, either during construction activities or recreational activities. Because MEC may remain in place at OU3 T JPHC, statutory reviews will be conducted at least every 5 years to evaluate whether the remedy remains protective of human health.

For Alternative 2A, there are 1,107 anomalies that remain to be excavated in the three grids. Based on data collected during previous investigations and removal actions, it is unlikely that additional DMM-HE would be located in the 3.6 upland acres that would be subject to anomaly removal in this alternative.

For Alternative 2B, there are 17,301 anomaly locations remaining in the intertidal zone between the MHHW and MLLW lines. Based on the results of the RI, it is projected that approximately four DMM with HE items would be removed from the intertidal zone. Removal of all detected anomalies in the intertidal area by implementation of Alternative 2B would allow access throughout the intertidal zone for shellfish harvesting.

For Alternative 2C, at least 3,939 anomalies would be investigated in approximately 5.3 acres of the 46 acres comprising the intertidal zone at OU 3T JPHC. It is projected that one additional DMM-HE item may be found during this clearance effort based on past investigation results. Depending on the results of this clearance operation (i.e., whether or not additional DMM-HE items were removed), Alternative 2C may provide a small reduction in the potential for DMM-HE to be encountered in areas subject to clearance.

In summary, the volume of untreated DMM-HE remaining at the site is believed to be low, even in the absence of further remedial action to remove these items. Remedial alternatives evaluated may result in removal of additional DMM-HE, but are not expected to result in treatment of significant volumes of DMM-HE.

9.5 Estimated Time Required for Design and Construction

Implementation of the selected remedy could begin within 15 months of completion of this ROD. The selected remedy includes treatment methodologies and technologies that have been implemented in the past. It is anticipated that implementation of the removal actions in the selected remedy would require updating project planning documents prepared for Phase 2 of the RI. Implementation of any modifications to the LUCs or personnel training in Alternative 3 would also begin within 15 months of completion of this ROD.

The remedial actions would be able to be performed in less than 2 years from the start date. The Alternative 2A field work in the upland portion of JPHC is anticipated to take 3 to 4 months to complete. Field work for Alternatives 2B or 2C in the intertidal zone is anticipated to take 3 to 8 months to complete, as it involves limitations based on adherence to tide cycle constraints and fish windows.

9.6 Estimated Time to Reach Cleanup Levels

Previous investigations and removal actions have provided some permanent reduction in the volume of MEC items at JPHC. Mobility of DMM-HE is generally not a concern, because metallic items are not expected to migrate unless they are exposed by erosion or unearthed during ground-disturbing activities. Alternatives 2A, 2B, and 2C will result in the potential reduction of toxicity and quantity (volume) of DMM-HE at JPHC; however, the number of

DMM that may be removed during implementation of any of these remedial actions is expected to be small.

9.7 Estimated Cost of Remedy

Costs shown below are estimated with an accuracy of +50 percent to -30 percent, consistent with CERCLA guidance. The lowest cost alternative to implement is Alternative 1, as there are no costs associated with this alternative. Only capital (short-term) costs would be incurred for Alternative 2 (Table 9-1).

Table 9-1. Capital Costs for Alternative 2 Components

Alternative	Capital Cost
2A 3-Grid Upland DMM Clearance	\$1,383,000
2B 100% Intertidal DMM Clearance	\$5,810,000
2C 4-Grid Intertidal DMM Clearance	\$1,901,000

The costs for Alternative 3 have been estimated for a 50-year time period. Present worth analysis is used to evaluate expenditures that occur over different time periods by discounting all future costs to the current year. This allows the cost of remedial alternatives to be compared on the basis of a single figure representing the amount of money that would be sufficient to cover all costs associated with the remedial alternative during its planned life.

Table 9-2 includes the cost of each alternative over 50 years expressed in 2010 dollars (present worth). The table also shows the cost of the alternative allowing for a 2.8 percent annual inflation rate (future worth), based on the average of the consumer price index from 1999 to 2009². The future worth is calculated as follows:

$$FV = \Sigma PW(1+i)^n$$

Where: FV = future worth
PW = present worth
i = inflation rate (2.8%)
n = year (0 to 50)
 Σ = sum for each year n

The present value is the amount of money that would need to be set aside at the start of the remedy implementation to cover its cost over the full 50-year implementation period (EPA 2000). The present value is calculated using the December 2009 30-year real discount rate of 2.7 percent from Appendix C of OMB Circular A-94³ as follows:

$$PV = \Sigma PW/(1+d)^n$$

Where: PV = present value

² See [ftp://ftp.bls.gov/pub/special.requests/cpi/cpiat.txt](http://ftp.bls.gov/pub/special.requests/cpi/cpiat.txt).

³ See http://www.whitehouse.gov/omb/circulars_a094_a94_appx-c/.

PW = present worth
d = discount rate (2.7%)
n = year (0 to 50)
 Σ = sum for each year n

Alternative 3A has the greatest long-term cost, which is associated with a full-time UXO Technician being present at JPHC for the next 50 years.

Table 9-2. Alternative 3 Costs

Alternative		O&M/ Monitoring	DMM Construction Oversight	Present Worth	Present Value
3A(1)	Upland Oversight	\$16,018,000	\$7,039,000	\$23,056,000	\$12,384,000
3A(2)	Shellfish Harvest Oversight	\$14,458,000	\$0	\$14,458,000	\$8,008,000
3B	LUCs	\$1,147,000	\$250,000	\$1,397,000	\$771,000
3C	LUCs plus Enhanced Training	\$2,431,000	\$204,000	\$2,635,000	\$1,459,000

9.8 Expected Outcomes of Each Alternative

The land use upon completion of the selected remedy for the upland areas of OU 3T JPHC remains unchanged and LUCs would be continued as they were before the remedy was implemented. The land use, upon completion of the selected remedy for the intertidal areas of OU 3T JPHC, is anticipated to remain unchanged until such time as the shellfish harvesting advisory by the Health District is lifted allowing commercial, tribal, or recreational shellfish harvesting activities.

10. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The nine NCP criteria relative to OU 3T JPHC are discussed below. The criteria are divided into three groups. The first two criteria are the threshold criteria. They relate to statutory requirements each alternative must satisfy to be eligible for selection. The next five are the primary balancing criteria upon which detailed analysis is primarily based. The last two are modifying criteria. After formal public comment is considered, the lead agency may modify aspects of an alternative or choose another based on these criteria.

The alternatives that are proposed have been developed based on overall assessment of JPHC's relatively low degree of explosive hazard. The alternatives also take into account previous munitions removal operations by the Navy through 1998, the TCRA as part of the 2000 OU 1 ROD removal actions from 1999 to 2002, the removal of metallic items from the surface of JPHC, and the anomaly removal operations during the RI. The comparative analysis is summarized in Table 10-1 (at the end of the section).

10.1 Overall Protection of Human Health and the Environment

This threshold criterion evaluates a remedial alternative's ability to provide adequate protection of human health and the environment, and evaluates how potential explosive hazards are effectively eliminated or reduced through controlling exposures by treatment, engineering controls, or institutional controls. The overall protection achieved by a proposed alternative is measured in terms of the alternative's short-term and long-term effectiveness and compliance with ARARs/TBCs in reducing unacceptable hazards associated with the site.

Under Alternative 1, there would be no further remedial actions for removal of MEC. Any MEC items found on site would be managed through the local emergency response system.

The treatment method that has been used at JPHC has been the removal of DMM as described above through excavation of detected subsurface anomalies. This method would be continued through adoption of any of the Alternative 2 components. The degree to which Alternative 2 provides for removal and treatment of DMM is dependent upon encountering DMM during the execution of Alternative 2. Based on the low incidence of DMM at the site, it is expected that the number of DMM items that would be found during execution of Alternative 2 would be low. Oversight of construction activities is continued as part of the LUCs options evaluated in Alternative 3. Education and awareness improves public awareness and reduces likelihood of mishandling any DMM that might be encountered. Alternative 3C provides enhanced education and awareness by requiring further munitions response and recognitions training for those most responsible for managing ground-disturbing activity at the site.

All alternatives evaluated provide adequate protectiveness from explosive hazards posed from potential encounters with DMM-HE at the site.

10.2 Compliance with ARARs

This threshold criterion is used to determine how each proposed alternative complies with applicable or relevant and appropriate federal and state statutory requirements, or if a waiver is required and how it is justified. If no ARARs are available, other considerations such as risk-assessment-derived numerical concentrations, policies, guidance, and advisories should be evaluated as TBCs. The assessment may also address information from advisories, criteria, and guidance that the lead and support agencies designate as TBCs. Three classes of ARARs to be addressed are contaminant-specific, location-specific, and action-specific.

The alternatives were evaluated to determine compliance with contaminant-specific laws and regulations such as the Clean Water Act, Clean Air Act, RCRA, and MTCA and guidance documents from the DoD. All of the alternatives will meet these requirements.

Location-specific requirements are included in the Endangered Species Act, Washington Shoreline Management Act, Migratory Bird Treaty Act, National Historic Preservation Act, and Executive Order 11990 (Protection of Wetlands). The Navy will comply with these requirements and not seek a waiver.

Action-specific regulations, such as Washington's Transportation of Hazardous Materials and Hazardous Waste Management acts, relate to the transportation of potentially hazardous items. No waivers would be needed for compliance with these regulations.

With the exception of Alternative 1, all of the proposed alternatives comply with ARARs and TBCs identified for OU 3T JPHC. Under DoD STD 6055.9, Navy and DoD policy requires continuation of the existing awareness and education program for residents, visitors, and contractors; therefore, Alternative 1 is not compliant with this policy, which is a TBC for the site.

10.3 Long-Term Effectiveness and Permanence

This balancing criterion addresses the results of a remedial action in terms of the residual explosive hazard after the remedial alternative has been implemented. The primary focus of this evaluation is to determine the effectiveness and permanence of the controls that may be required to manage the hazard posed by DMM-HE. The factors to be evaluated include the adequacy, suitability, capabilities, and limitations of current technologies, and the long-term reliability and enforceability of management controls for providing continued protection from residual hazards (i.e., assessment of the potential failure of technical or administrative components on the alternative).

Limitations of current subsurface detection and discrimination technology prevent 100 percent removal of all potential DMM. Consequently, none of the alternatives evaluated can guarantee that the explosive hazard from the site will be totally eliminated following remedy implementation. Alternative 1 and the other alternatives manage the potential hazard through the existing emergency response system for potential encounters with DMM. To the extent

additional DMM-HE are removed during implementation, Alternative 2 will reduce the potential explosive hazard in specific areas through the excavation and removal of existing anomalies, with Alternative 2C providing for the greatest potential relative reduction. Alternative 3 manages potential explosive hazards through continued use of LUCs, the excavation permitting process, and munitions education and awareness training. While some changes to existing procedures for managing explosive hazards would be required for implementation of Alternative 3C, it is believed that Alternative 3 can be effectively implemented.

10.4 Reduction of Toxicity, Mobility, and Volume

This balancing criterion addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce the toxicity, mobility, or volume of the contaminants. The factors to be evaluated include the treatment process employed; the amount of hazardous material removed and destroyed; the degree of reduction expected in toxicity, mobility, or volume; the type and quantity of treatment residuals; and whether environmental controls are necessary.

Previous investigations and removal actions have provided some permanent reduction in the volume of MEC items at JPHC. Mobility of DMM-HE is not a concern, because metallic items are not expected to migrate unless they are exposed by erosion or unearthed during ground-disturbing activities.

Alternatives 2A, 2B, and 2C will result in the potential reduction of toxicity and quantity (volume) of DMM- HE at JPHC; however, the number of DMM items that may be removed during implementation of any of these remedial actions is expected to be small.

Alternatives 1 and 3 will reduce the amount of DMM at JPHC only if DMM is encountered during ground-disturbing activities.

10.5 Short-Term Effectiveness

This balancing criterion addresses the effects of a proposed alternative on the public, the environment, and the remediation workers during its implementation and up until the time the remedial objectives have been met. Each proposed alternative is evaluated with respect to the degree to which the community and on-site workers are protected from exposure and hazard during the remedial action, and the nature and magnitude of ecological, socio-economic, and cultural impacts associated with the implementation of the remedial alternative.

All of the alternatives pose acceptable risks to the public and environment, given the low explosive hazard at the site. Alternative 2, with its removal actions, does pose a moderate but manageable risk to workers and the environment during anomaly excavation activities that would be conducted in a manner that is similar to past removal actions. The risks for workers implementing Alternative 3 are the same or lower than during implementation of Alternative 2, in that active removal of known anomalies will generally not be done under Alternative 3.

10.6 Implementability

This balancing criterion addresses the technical, administrative, and operational feasibility of implementing a proposed alternative, and the reliability of the supply of various services and materials that would be required during its implementation. Technical feasibility considers potential construction and operational difficulties, the likely duration of the response, the practicality of the alternative, the ease of undertaking additional supplemental or corrective remedial actions in the future (if required), and the ability to monitor the effectiveness of that remedy. Administrative feasibility considers the type and practicality of the activities needed to coordinate with other agencies (e.g., state and local) in order to obtain the permits or approvals needed to implement the remedial action. The availability of infrastructure services and materials required to implement the remedial action are also considered as part of operational feasibility.

Remedial alternatives aimed at removing additional subsurface anomalies (i.e., Alternative 2) rely on the same technical approach as was used for anomaly removal during remedial investigations and are, therefore, deemed to be implementable. LUCs considered under Alternative 3 have also been effectively implemented to some degree at the site and are also viewed as implementable.

10.7 Cost

This balancing criterion addresses the capital costs and annual O&M costs associated with implementing the remedial alternative, and combine these costs in a total present worth format to facilitate comparison among other alternatives. Capital costs consist of direct and indirect costs. Direct costs include expenditures for the equipment, labor, and material necessary to perform the remedial action and are based on actual costs incurred over the past several years by the Navy. Indirect costs include expenditures for engineering, financial, and other services that are not part of the actual response activities and services but are required to complete the implementation of the remedial alternative. Annual operation and maintenance costs are post-construction costs required to ensure the continued performance of the remedial action. These costs will be estimated to provide an accuracy of +50 percent to -30 percent consistent with CERCLA guidance.

A 50-year present worth analysis is used to evaluate expenditures that occur over different time periods by discounting all future costs to a common base year, usually the current year. This allows the cost of remedial alternatives to be compared on the basis of a single figure representing the amount of money that would be sufficient to cover all costs associated with the remedial alternative during its planned life.

Table 10-1 contains a summary of the cost associated with each of the alternatives. The lowest cost alternative to implement is Alternative 1, as there are no costs associated with this alternative. Alternative 3A has the greatest long-term cost which is associated with a full-time UXO Technician being present at JPHC for the next 50 years.

10.8 State Acceptance

This modifying criterion evaluates the technical and administrative issues or concerns of Ecology, the DNR, or other local regulatory authorities may have regarding the proposed alternatives. The factors to be evaluated include those features of the alternatives that these agencies support or oppose, and other preferences or reservations expressed by the agencies.

No state-agency comments, concerns, or objections were presented regarding the preferred remedy as articulated in the Proposed Plan for Discarded Military Munitions Removal and Education at Jackson Park Housing Complex during the public comment period from November 1, 2010, to December 15, 2010. No additional comments or objections are anticipated to be forthcoming from the State agencies. Ecology did not review any of the primary documents or the ROD for this site. Ecology deferred the review of those documents to EPA.

In a letter to the Navy dated December 14, 2010, the Suquamish Tribe expressed its support for the preferred alternative.

10.9 Community Acceptance

This modifying criterion considers public preferences and concerns expressed on the proposed alternatives. These preferences and concerns are expressed through the public comment period for the Proposed Plan describing the preferred remedial alternative, and addressed in the Responsiveness Summary in this ROD. During the comment period, including the public meeting held on November 15, 2010, no comments or objections were received from the general public and no comments or objections are anticipated to be forthcoming.

July 28, 2011

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Table 10-1. Summary of Threshold and Modifying NCP Criteria Evaluation for JPHC for Residential Land Use

Criteria	Alternative 1	Alternative 2A	Alternative 2B	Alternative 2C	Alternative 3A	Alternative 3B	Alternative 3C
Threshold	No Further Action (NFA)	Removal of 100% of Anomaly Items in 3 Upland Grids	Removal of 100% of Anomaly Items in Intertidal Zone	Removal of 100% of Anomaly Items in 4 Intertidal Grids	LUCs/Permitting/UXO Avoidance Oversight of Construction Activities	LUCs/Permitting/On-Call UXO Avoidance Oversight of Construction Activities	LUCs/Permitting/Enhanced MEC Recognition and Response Training/ On-Call UXO Response to DMM Discovery
Overall Protectiveness of Human Health and the Environment	Adequate protection based on low DMM incidence at site. NFA includes emergency response by 911 for discovery of DMM item(s) plus response by EOD MU 11 Det. Bangor if necessary.	Low likelihood of removal of additional DMM items from any of the 3 grids based on Phase 2 RI data. Consequently, low likelihood of any reduction in potential to encounter DMM-HE items at the site. Provides greater degree of certainty regarding low DMM-HE incidence at the site.	Likely removal of small number of DMM-HE items in part of the site. Small reduction in the already low likelihood of encounter with DMM items at the site. Provides greater degree of certainty regarding low DMM-HE incidence at the site.	Low likelihood of removal of additional DMM items from any of the 4 grids based on Phase 2 RI data. Consequently, low likelihood of any reduction in potential to encounter DMM-HE items at the site. Provides greater degree of certainty regarding low DMM-HE incidence at the site.	Low likelihood of encounter with DMM-HE items during ground-disturbing activity at the site. Oversight provided by UXO Technician II unlikely to provide any reduction in hazard compared to oversight by site-specific trained individual. Education and awareness component reduces likelihood of mishandling any DMM item that might be encountered.	Low likelihood of encounter with DMM-HE items during ground-disturbing activity at the site. Education and awareness improves public awareness and reduces likelihood of mishandling any DMM item that might be encountered. Ground-disturbing activities supervised by site-specific trained individual.	Low likelihood of encounter with DMM-HE items during ground-disturbing activity at the site. MEC recognition and response training improves manager and contractor improves public awareness and reduces likelihood of mishandling any DMM item that might be encountered. Annual refresher training maintains long-term MEC awareness at JPHC. Ground-disturbing activities supervised by site-specific trained individual.
Compliance with ARARs/TBCs	Complies with ARARs/TBCs	Complies with ARARs/TBCs	Complies with ARARs/TBCs	Complies with ARARs/TBCs	Complies with ARARs/TBCs	Complies with ARARs/TBCs	Complies with ARARs/TBCs
Summary	●	⊙	⊙	⊙	⊙	⊙	⊙
Long-term Effectiveness	DMM not eliminated. Residual hazard adequately addressed.	DMM not eliminated. Uncertain degree of potential exposure reduction. Residual hazard adequately addressed. Operations and maintenance required.	DMM not eliminated. Uncertain degree of potential exposure reduction. Potential for eliminating need for long-term LUCs.	DMM not eliminated. Uncertain degree of potential exposure reduction. Residual hazard adequately addressed. Operations and maintenance required.	DMM not eliminated. Uncertain degree of potential exposure reduction. Residual hazard adequately addressed. Long-term effort required.	DMM not eliminated. Uncertain degree of potential exposure reduction. Residual hazard adequately addressed. Long-term effort required.	DMM not eliminated. Uncertain degree of potential exposure reduction. Residual hazard adequately addressed. Long-term effort required.
Reduction of Toxicity, Mobility and Volume	No reduction beyond infrequent response and treatment of DMM items encountered during ground-disturbing activity.	Unlikely that any additional DMM-HE items would be removed or treated from any of the 3 grids. Little if any reduction.	Likely removal of small numbers of DMM-HE items from the intertidal zone. Small reduction.	Unlikely that any additional DMM-HE items would be removed or treated from any of the 3 grids. Little if any reduction.	No reduction beyond infrequent response and treatment of DMM items encountered during ground-disturbing activity.	No reduction beyond infrequent response and treatment of DMM items encountered during ground-disturbing activity.	No reduction beyond infrequent response and treatment of DMM items encountered during ground-disturbing activity.
Short-term Effectiveness	Acceptable risk level for community, workers, and the environment.	Acceptable risk level for the community. Moderate, but acceptable, additional hazard to workers and the environment.	Acceptable risk level for the community. Significant disruption of intertidal environment and moderate additional hazard to workers.	Acceptable risk level for the community. Significant disruption of intertidal environment and moderate additional hazard to workers.	Acceptable risk level for the community. Mitigating, and acceptable, hazard to workers, shellfish harvesters, and the environment.	Acceptable risk level for the community. Mitigating, and acceptable, hazard to workers, shellfish harvesters, and the environment.	Acceptable risk level for the community. Mitigating, and acceptable, hazard to workers, shellfish harvesters, and the environment.
Implementability	Alternative is implementable with no significant technical issues. However, Navy policy requires continuation of education/awareness training. Therefore, alternative is not administratively implementable. Discovery of DMM items may trigger RCRA military munitions rule (MMR) or DDESB 6055.9 response.	Alternative is implementable with no significant technical or administrative issues.	Alternative is implementable with no significant technical or administrative issues.	Alternative is implementable with no significant technical or administrative issues.	Alternative is implementable with no significant technical or administrative issues. Discovery of DMM items may trigger RCRA MMR or DDESB 6055.9 response.	Alternative is implementable with no significant technical or administrative issues. Discovery of DMM items may trigger RCRA MMR or DDESB 6055.9 response.	Alternative is implementable with no significant technical or administrative issues. Discovery of DMM items may trigger RCRA MMR or DDESB 6055.9 response.
Cost (Present Worth)	No Cost	\$1,383,000	\$5,810,000	\$1,901,000	3A(1) \$23,056,000 3A(2) \$14,458,000	\$1,397,000	\$2,635,000
Cost (Future Value)	No Cost	\$1,383,000	\$5,810,000	\$1,901,000	3A(1) \$51,518,000 3A(2) \$31,294,000	\$3,040,000	\$5,718,000
Cost (Present Value)	No Cost	\$1,383,000	\$5,810,000	\$1,901,000	3A(1) \$12,384,000 3A(2) \$8,008,000	\$771,000	\$1,459,000
Summary	●	⊙	⊙	⊙	●	⊙	⊙

Legend -
● - Not Preferred
⊙ - Acceptable
○ - Best

11. SELECTED REMEDY

The selected remedy includes continued implementation of LUCs combined with removal of additional detected subsurface metallic anomalies. These alternatives were based on the following:

- Previous surface removal of metallic items (including DMM and MPPEH) from accessible areas of JPHC.
- Existence of a successful education and awareness program used to inform JPHC residents and contractors of the potential for finding DMM when digging at JPHC. The preferred alternative provides for additional munitions recognition and response training for key personnel responsible for managing the existing dig permit program, as well as for personnel responsible for managing projects that require ground-disturbing activity.
- Removal of anomalies from areas where DMM-HE has been found in the past will reduce the potential future exposure to DMM in selected upland areas and the intertidal area of JPHC where shellfish harvesting may be a possible future land use.

11.1 Rationale for the Selected Remedy

The selected remedy continues the existing LUCs established for JPHC, adds enhanced munitions recognition and response training for personnel directly responsible for the excavation permit process, and reduces the potential for future contact with residual DMM/MPPEH through removal of additional anomalies in grids where DMM-HE has been previously identified. In addition, the selected remedy provides additional certainty that the DMM-HE incidence at the site is low and that future encounters with such items are unlikely.

Alternatives 2A and 2B are response actions that provide for potential removal and treatment of DMM-HE through removal of subsurface metallic items at remaining Phase 2 subsurface anomaly locations. Implementation of Alternatives 2A and 2B may provide some reduction in potential explosive hazards posed by the site and, at a minimum, will provide a heightened degree of certainty regarding the residual hazard posed by potential encounters with DMM at the site. Alternative 2B is likely to result in the removal of a small number of DMM-HE from the intertidal area of site and, therefore, is expected to provide a reduction in the already low likelihood of an encounter with these items under future land use activities such as shellfish harvesting. Removal of detected subsurface anomalies provides for increased certainty that DMM incidence at the site is low and is effectively managed by LUCs.

Alternative 3C in conjunction with Alternatives 2A and 2B will be effective in managing the site-wide low degree of explosive hazard. The existing munitions education and awareness training program has been shown to be effective in managing existing explosive hazards at the site. Alternative 3C adds an additional measure of long-term protectiveness by requiring key personnel responsible for managing ground-disturbing activity to obtain enhanced munitions recognition and response training. Evaluation of remedial approaches for other munitions sites with similar explosive hazard issues has shown this to be an effective and accepted strategy for

addressing these hazards. Extensive data documenting the low likelihood of encountering a DMM-HE item during ground-disturbing activity support a conclusion that the cost of providing UXO Technician II oversight at all ground-disturbing activity, as evaluated under Alternative 3A, provides little if any demonstrable reduction in explosive hazard compared to Alternative 3B or 3C. On this basis, Alternative 3C is recommended as the preferred remedial alternative that provides for protective long-term institutional and engineering controls for the site.

11.2 Description of the Selected Remedy

The selected remedy includes Alternatives 2A, 2B, and 3C.

11.2.1 Alternative 2A—Removal of Anomalies in Uplands Grids 166, 227, and 274

Upland DMM clearance would be performed in new 200-foot-square investigation grids (decision units) centered on the location of the DMM-HE item within grids 166 and 227 (Figures 9-2 and 9-3, respectively). Each of these investigation grids will cover 40,000 square feet of JPHC. Two DMM-HE items were found 115 feet apart in grid 274. A single investigation grid will be used that incorporates the two DMM-HE items in grid 274. This grid will be 300 feet (north-south) by 256 feet (east-west), covering an area of 76,800 square feet.

Investigation of the anomalies will be done using methods established for the RI. If a DMM-HE item is discovered near the perimeter of the grid (i.e., within 25 feet of the perimeter), additional anomaly sites will be investigated. The additional anomaly investigation area (i.e., step-out area) will be a 100-foot-wide area adjacent to the side of the grid where the DMM-HE item was discovered. If data gathered in this step-out area indicates the existence of a potential accumulation of DMM-HE items (i.e., burial pit, burn area, etc.), the need for additional clearance will be considered.

Table 11-1 lists the investigation grids, the DMM-HE item locations for each grid, and the northwest and southeast corners of the investigation grids. The locations of the DMM and grid corners are easting and northing coordinates in the Washington State Plane North zone (North American Datum of 1983, feet). Areas to be excluded from each investigation grid will include roads, buildings, utility easements, and sidewalks, and other areas that were excluded in the RI.

Table 11-1. Upland Investigation Grids

Grid No.	Number of Anomalies	Anomalies Investigated in the RI	Anomalies to be Investigated	DMM with HE Location	Grid NW Corner	Grid SE Corner
166	174	22	152	E1181318, N220265	E1181218, N220365	E1181418, N220165
227	379	60	319	E1181645, N221668	E1181545, N221768	E1181745, N221568
274	736	100	636	E1182065, N220357 and E1182009, N220256	E1181909, N220457	E1182165, N220157

Using this investigation grid system, at least 1,107 anomalies would be investigated in approximately 3.6 acres of the 186 acres of the upland part of OU 3T JPHC.

Based on data from the Phase 2 RI, it is projected that no additional DMM-HE would be encountered during the removal of 100 percent of detected subsurface anomalies in the upland grids listed above. Removal of these additional anomalies will provide additional certainty that the DMM-HE incidence rate for the site is low.

11.2.2 Alternative 2B—Removal of Anomalies in the Intertidal Zone

Alternative 2B involves removal of 100 percent of detected subsurface anomalies in the intertidal zone using methods developed in Phase 2 of the RI. The intertidal zone covers approximately 42 acres (1.8 million square feet) and extends from JPHC to NHB. There were 19,548 anomalies identified in Phase 2, and 2,517 were investigated. Under this scenario, 17,031 anomalies would be investigated in the 46-acre intertidal zone bounded by the MHHW and MLLW lines. The decision unit would not be expanded by discovery of a DMM-HE item near the MHHW line, MLLW line, or OU 3T boundary. After intrusive investigations from 1998 to 2001 conducted during the OU1 ROD, a geotextile fabric was placed along the upland side of the JPHC intertidal-upland boundary and then covered with 1 foot of fill material. The mesh extends approximately 1,500 feet from grids 7 to 18 and approximately 800 feet from grids 35 to 49 on the upland side of the MHHW line (Foster Wheeler 2002d). The approximate location of the geotextile is shown in Figure 9-1. No excavation beneath the geotextile west of the intertidal zone is planned in order to preserve the geotextile.

Assuming the DMM-HE incidence rate of 0.00021 and investigation of 17,031 anomaly locations, approximately four DMM-HE items are projected to be recovered during execution of Alternative 2B.

11.2.3 Alternative 3C—Land Use Controls

The following elements apply to Alternative 3C as a component of the selected remedy:

1. Alternative 3C applies to all developed and undeveloped areas of JPHC.
2. Reporting and response to a discovery of a potential DMM item at JPHC are continued using the 911 system. A response to a "911" call is initiated by Regional Dispatch Center to provide notification and on-site response by EOD MU 11 Det. Bangor.
3. The excavation permit process JPHC will be continued to ensure that all ground-disturbing activity at the site is permitted prior to execution and that all prerequisites for obtaining such a permit are met prior to initiation of ground-disturbing activity (i.e., personnel are appropriately trained). Shellfish harvesting is not currently permitted in the intertidal area; however, it is anticipated that shellfish harvesting will occur in the future. Should shellfish harvesting resume, it is assumed to be the most significant ground-disturbing activity that will occur in the intertidal zone. Shellfish harvesting would occur within the intertidal areas of the site and may take place during the day or night. In anticipation of future shellfish harvesting, the Navy will work with the Tribe to develop

awareness training that specifically addresses subsistence, commercial, or recreational shellfish harvesting activities upon selection of this alternative. Once the harvesting advisories are lifted, the education program specific to shellfish harvesting will be revised with Tribal involvement. The Navy would require all participants in shellfish harvesting activities to receive relevant education and awareness training prior to being allowed to harvest shellfish in the intertidal areas of the site.

4. The excavation permit program will allow auditing and tracking of the dig permit from the initial request for the permit through the closure of the approved permit.
5. Munitions awareness education and training will be provided at two levels:

Basic: Basic training is provided to residents and all applicants for dig permits at JPHC. This training consists of viewing the "Jackson Park Precautions Briefing" video. Additional educational material will be provided that includes information on history of the site as a former NAD, results of munitions investigations conducted, basic MEC identification, proper reporting procedures, and precautionary measures.

This level of training would be required for all residents, as well as for contractors performing ground-disturbing activities at the site, as is currently the case. This training would be managed by personnel who have received enhanced training.

Enhanced: Enhanced explosive safety management and munitions recognition training would be provided to personnel responsible for managing and supporting the excavation permitting process or providing oversight of some aspect of ground-disturbing activities at the site. The Public Works office responsible for managing the excavation permit process, the JPHC operation and maintenance contractor personnel responsible for supporting the excavation permit program, engineering technicians responsible for providing oversight at projects that require ground-disturbing activity, other contractors responsible for major maintenance and/or demolition activity, and others as deemed appropriate would be required to receive expanded training.

The expanded training is assumed to consist of an ordnance recognition and awareness course designed to train participants in identification of potential explosive hazards, recognition of MEC items, and response actions to be taken on discovery of MEC. This training would be provided in a classroom and field setting and is envisioned to include simulation of potential DMM encounters as part of the training. Periodic refresher training would be required to ensure training for these personnel is updated. These courses will include:

History of JPHC

- Review the operational life of JPHC and NHB, including munitions manufactured, stored, and transported at JPHC from 1908 to 1959.

- ROD, TCRA, and RI/FS investigations.
- DMM discoveries.

Explosives and Explosive Effects

- Basic understanding of explosives and explosive effects.
- MEC and MPPEH.
- Understanding of weathering effects on MEC and MPPEH.
- MEC and Explosives Safety Precautions.

Munitions Response Planning

- Excavation Safety and Personal Protective Equipment.
- Field exercise that demonstrates knowledge of policies, requirements, and procedures in the safe performance of MEC and MPPEH duties.

6. For "major projects" (i.e., demolition, construction, or renovation of significant areas of the housing complex), key contractor personnel responsible for managing or executing ground-disturbing activity would also be required to obtain enhanced training. The requirement for obtaining training of these personnel would be a condition of the contract to execute the "major" project.
7. If a potential DMM-HE item is encountered during a ground-disturbing activity, response would be provided by EOD MU 11 Det. Bangor under existing response procedures. A complete report concerning the discovery of a DMM-HE item at the site would be provided to EPA in a timely manner.
8. The implementation of this remedy would be monitored and reported in annual institutional controls monitoring reports as well as 5-year review reports. The enhanced training and dig permit program would be reviewed every 5 years for effectiveness and modified as necessary to remain protective of human health and the environment.
9. Dig permit or other records, including signature acknowledgement of notification and understanding regarding munitions hazards shall be maintained for a minimum of 3 years beyond completion of ground-disturbing site work or termination of residency.
10. The Navy would be responsible for implementing, maintaining, reporting, and enforcement of LUCs as well as ensuring that all elements of the selected remedy (including provisions for oversight of ground-disturbing activity) are executed as required by the final ROD.
11. The LUC implementation and maintenance actions, including periodic inspections, will be included in the remedial design for the selected remedy.

11.3 Cost Estimate for the Selected Remedy

Cost estimates for each alternative are discussed below. Cost estimates have been prepared using "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study" (EPA 2000). The cost estimates contain a 20 percent contingency (10 percent each for scope and bid contingencies). The 20 percent contingency was used instead of the 25 percent contingency

cited in EPA (2000) because experience from Phase 1 and Phase 2 has reduced uncertainties in the project scope.

11.3.1 Alternative 2—Supplemental Excavation and Removal of Metallic Anomalies

Removal of the anomalies will be done using methods established for the RI. For Alternative 2A, the removal areas (decision units) will be centered on the locations where DMM-HE was found. The decision unit for the intertidal area (Alternative 2B) will be the approximately 42-acre intertidal area within OU 3T JPHC. Execution of each alternative will require development of a project plan based on the Phase 2 RI Project Plan (includes potential modifications to the existing work plan, quality control plan, site safety and health plan, and disposal plan). On-site activity would include mobilization, the site investigation, removal, and disposal of MEC or scrap items, and demobilization. A remedial action closure report will be prepared for each decision unit.

11.3.1.1 Alternative 2A – Upland DMM with HE Clearance

Four DMM-HE items were recovered from upland grids 166, 227, and 274 where 1,103 metallic anomalies were identified and 139 anomalies were removed during Phases 1 and 2 of the RI. Upland DMM clearance will be performed in new 200-foot-square investigation grids centered on the location of the DMM-HE item within grids 166 and 227. Each of these investigation grids will cover 40,000 square feet of JPHC.

Two DMM-HE items were found 115 feet apart in grid 274. Creating two 200-foot-square grids around these two DMM items will result in a 14,300-square-foot overlap in the investigation grids. To facilitate management of the field investigation program, a single investigation grid will be used that incorporates the two DMM-HE items in grid 274. This grid will be 300 feet (north-south) by 256 feet (east-west), covering an area of 76,800 square feet. Within the new grids, 1,289 metallic anomalies in total were identified during Phase 2 of the RI, 169 metallic anomalies removed during the RI, leaving 1,120 metallic anomalies to be investigated.

Investigation of the anomalies will be done using methods established for the RI. In the event a new DMM-HE item is discovered near the perimeter of the grid (i.e., within 25 feet of the perimeter), additional anomaly sites will be investigated. The additional anomaly investigation area (i.e., step-out area) will be a 100-foot-wide area adjacent to the side of the grid where the DMM-HE item was discovered.

Areas to be excluded from each investigation grid will include roads, buildings, utility easements, sidewalks, and other areas that were excluded in the RI. The locations of the DMM and grid corners are easting and northing coordinates in the Washington State Plane North zone (North American Datum of 1983, feet).

Costs for implementation of Alternative 2A are shown in Table 11-2.

Table 11-2. Cost To Implement Alternative 2A

Task	Total
Mobilization/Demobilization	\$94,308
Intrusive Investigation (1,120 Anomalies)	\$847,106
Step-Out Investigation (200 Anomalies)	\$99,792
Project Management, Meetings, and Reporting	\$110,985
Subtotal	\$1,152,191
Contingency (20%)	\$230,438
Total	\$1,382,629

Mobilization/Demobilization

This task includes the site activities required prior to the start of the intrusive investigation. A description of the activities to be accomplished and the assumptions related to the task include the following:

1. The project will be completed in one mobilization/demobilization.
2. The operational readiness review is included in this task. All aspects of the project are reviewed to ensure that project objectives are met.
3. This task includes a kick-off meeting with the BOSC to notify them of what is anticipated to be an upcoming increase in their workload.
4. Activities include:
 - a. Receive and inspect vehicles; modify a pick-up truck for explosives transport.
 - b. Prepare the first set of dig permits.
 - c. Conduct mutual understanding, pre-construction, operational readiness review, and BOSC meetings.
 - d. Install and check computer equipment, personal digital assistants, and data transfer capabilities.
 - e. Certify test bed for the geophysicists and equipment for the UXO technicians.
 - f. Perform an emergency drill.
 - g. Collect and review of personnel training records.
5. Training for site staff will be conducted and will include:
 - a. Project orientation.
 - b. Site-specific waste management and DOT hazardous materials training.
 - c. Work plan and standard operating procedure review.
 - d. MEC discovery and notification procedures.

This task also involves the disposition of the recovered MEC-related items. Aspects of this activity include:

1. Licensing, moving, and setting up the thermal flashing unit.
2. Flashing and destruction of the recovered MPPEH under DOD supervision.
3. One flashing event is planned for the end of the project.

Intrusive Investigation

This task includes the performance of the intrusive investigation. Several assumptions used in the development of the proposal include:

1. The production metric utilized to develop the anticipated project duration is based on the following:
 - a. Each team will intrusively investigate 15 targets per day. Figures 9-2 to 9-4 show the geometry of the decision units and the number of anomalies to be investigated per decision unit.
 - b. There are at least 1,120 anomalies to be investigated in the three decision units. This production rate translates to a 7.5-week field effort for two teams composed of three UXO technicians each. An additional 5 days has been added to the schedule to account for vegetation removal and production loss related to potential DMM discovery, adverse weather, and other unforeseeable events for a total duration of 8.5 weeks.
 - c. One step-out investigation is assumed to be required. It is assumed that 200 anomaly locations will be investigated. The step-out investigation will require an additional four days. Based on data from the Phase 2 RI, it is probable that no step-out clearance will be required. However, for purposes of alternative analysis, costing assumes one step-out.
2. The work week is five 10-hour days.
3. The utility location contractor and vegetation removal/site restoration subcontractor are included in this task.
4. Weekly inspections of the MEC storage area are included in this task.

Step-Out Investigation

Included in this task are costs for a step-out investigation of 200 anomalies. This investigation would be performed if a DMM-HE item is discovered during the intrusive investigation. A 200-foot-square grid would be centered on the DMM item, and all anomalies within this grid would be investigated, as described above.

Project Management

Project management extends throughout the life of the project and includes the activities associated with resource management; project cost and schedule tracking; billing and procurement authorization; communications with the RPM and Contracting Officer; oversight of

the fieldwork; tracking and issuing submittals and vouchers; obtaining dig permits; qualification of subcontractors; generation of technical scopes for bidding; research of equipment or vendor capabilities; maintenance of the submittal register; support to project controls; coordination with NAVFAC NW, NBK Environmental, Waste Disposal, and Housing Departments, the BOSC, and local emergency services; and other related tasks.

Meetings with NAVFAC NW staff, JPHC residents affected by the intrusive operations, weekly progress meetings, and a meeting to update JPHC residents on the outcome of the investigation will be included in the project management task.

A remedial action closure report will be prepared as required by CERCLA. This report will summarize all data relevant to characterization of the nature and extent of DMM at the grids undergoing remediation at OU 3T JPHC. This data summarization shall include all relevant information from previous investigations or remedial efforts as well as data collected under this remedial effort.

The closure report will also include an assessment of data quality with respect to meeting DQOs, as well as a baseline assessment of explosive safety hazard (developed through MEC HA) for the site and for decision units within the site.

11.3.1.2 Alternative 2B – Intertidal 100 Percent DMM with HE Clearance

Alternative 2B involves removal of 100 percent of detected subsurface anomalies in the intertidal zone. The intertidal zone covers approximately 42 acres (1.8 million square feet) and extends from JPHC to NHB. There were 19,548 anomalies identified in Phase 2, and 2,517 were investigated, resulting in the removal of four DMM-HE items. Under this scenario, the remaining 17,031 anomaly locations in the intertidal area would be subject to removal of detected metallic items.

The decision unit for this alternative is the intertidal area. If a DMM-HE item is recovered near the boundary of the intertidal area, there will be no step-out investigation across the decision unit boundary.

The investigation of the intertidal area will be conducted using the same techniques that were used in Phase 2 of the RI. Operations in the intertidal zone will be constrained by the tidal cycle in Ostrich Bay, limiting access to the lower elevations of the intertidal area (i.e., near the MLLW line) to those times when this part of the area is not submerged. Anomaly removal operations are designed to take place when the area to be investigated is not under water; therefore, no run-on/run-off and sediment management techniques are required during excavations. Anomaly removal near the water line is performed from the water using a floating excavator. Anomaly removal near the upland-intertidal boundary will be performed using the same techniques as those used during Phase 2 of the RI.

Only tasks that show a change from Alternative 2A are repeated in this section. Costs for implementation of Alternative 2B are given in Table 11-3.

Table 11-3. Cost To Implement Alternative 2B

Task	Total
Mobilization/Demobilization	\$130,821
Intrusive Investigation (17,031 Anomalies)	\$4,384,585
Project Management, Meetings, and Reporting	\$325,956
Subtotal	\$4,841,362
Contingency (20%)	\$968,272
Total	\$5,809,635

Mobilization/Demobilization

Six additional UXO technicians would be mobilized beyond those mobilized for Alternative 2A. The additional personnel are necessary because of operational constraints caused by the tidal cycle in Ostrich Bay and because of the size of the decision unit. Mobilization/demobilization also includes setup and removal of the floating excavator.

Intrusive Investigation

This task includes the performance of an intrusive investigation. The assumptions and narrative associated with Alternative 2A apply with the following changes. There are at least 17,031 anomalies to be investigated the intertidal area. Teams will utilize a floating excavator and investigate an average of 137 anomalies per day. This translates to a 25-week field effort with an additional 5 days added to the schedule to account for production loss due to tides and potential DMM discovery, adverse weather, and other unforeseeable events, for a total duration of 26 weeks. It is assumed that mobilization will occur in mid-March to early April.

Remedial Action Report

No substantial changes from Alternative 2A.

11.3.2 Alternative 3C—Land Use Controls with Enhanced MEC Training

Costs for performing Alternative 3C are summarized in Table 11-4.

Table 11-4. Cost to Perform Alternative 3C

Task Summary	Frequency	Unit Cost	Contingency (20%)	Total
Operation & Maintenance	Annual	\$35,385	\$7,077	\$42,462
Education and awareness training, annual reporting, project management				
Utility Replacement/Maintenance	2-year intervals	\$5,597	\$1,119	\$6,716
Limited on-site support at start of excavation activities				
Housing Development Demolition/Construction	10-year intervals	\$5,995	\$1,199	\$7,194
Limited on-site support at start of excavation activities				
Setup / 5-Year Review	First year and 5-year intervals	\$20,141	\$4,028	\$24,169

The costs for implementation of Alternative 3C, rounded to the nearest \$1,000, are listed below:

- Present Worth (PW) \$2,635,000 (undiscounted 2010 dollars), includes 20 percent contingency
- Future Worth (FW) \$5,718,000
- Present Value (PV) \$1,459,000

Table 11-5 details the annual cost for implementation of Alternative 3C.

Table 11-5. Annual Cost to Implement Alternative 3C

Year	O&M/ Monitoring	Setup/ 5-Year Review	Maintenance Construction	Major Construction	Total Cost (PW)	Inflation Adjusted (FW)	Present Value (PV)
0	\$42,462	\$24,169	\$0	\$0	\$66,631	\$66,631	\$66,631
1	\$42,462	\$0	\$6,716	\$0	\$49,178	\$50,555	\$47,885
2	\$42,462	\$0	\$0	\$0	\$42,462	\$44,873	\$40,258
3	\$42,462	\$0	\$6,716	\$0	\$49,178	\$53,426	\$45,400
4	\$42,462	\$0	\$0	\$0	\$42,462	\$47,421	\$38,169
5	\$42,462	\$24,169	\$6,716	\$0	\$73,347	\$84,207	\$64,199
6	\$42,462	\$0	\$0	\$0	\$42,462	\$50,114	\$36,189
7	\$42,462	\$0	\$6,716	\$0	\$49,178	\$59,665	\$40,811
8	\$42,462	\$0	\$0	\$0	\$42,462	\$52,959	\$34,311
9	\$42,462	\$0	\$6,716	\$0	\$49,178	\$63,053	\$38,693
10	\$42,462	\$24,169	\$0	\$7,194	\$73,825	\$97,305	\$56,559
11	\$42,462	\$0	\$6,716	\$0	\$49,178	\$66,634	\$36,686
12	\$42,462	\$0	\$0	\$0	\$42,462	\$59,145	\$30,843
13	\$42,462	\$0	\$6,716	\$0	\$49,178	\$70,418	\$34,782
14	\$42,462	\$0	\$0	\$0	\$42,462	\$62,503	\$29,242
15	\$42,462	\$24,169	\$6,716	\$0	\$73,347	\$110,989	\$49,184
16	\$42,462	\$0	\$0	\$0	\$42,462	\$66,052	\$27,725
17	\$42,462	\$0	\$6,716	\$0	\$49,178	\$78,642	\$31,266
18	\$42,462	\$0	\$0	\$0	\$42,462	\$69,803	\$26,286
19	\$42,462	\$0	\$6,716	\$0	\$49,178	\$83,107	\$29,644
20	\$42,462	\$24,169	\$0	\$7,194	\$73,825	\$128,252	\$43,331
21	\$42,462	\$0	\$6,716	\$0	\$49,178	\$87,826	\$28,105
22	\$42,462	\$0	\$0	\$0	\$42,462	\$77,955	\$23,629
23	\$42,462	\$0	\$6,716	\$0	\$49,178	\$92,814	\$26,647
24	\$42,462	\$0	\$0	\$0	\$42,462	\$82,382	\$22,403
25	\$42,462	\$24,169	\$6,716	\$0	\$73,347	\$146,289	\$37,681
26	\$42,462	\$0	\$0	\$0	\$42,462	\$87,060	\$21,241
27	\$42,462	\$0	\$6,716	\$0	\$49,178	\$103,654	\$23,953
28	\$42,462	\$0	\$0	\$0	\$42,462	\$92,004	\$20,138
29	\$42,462	\$0	\$6,716	\$0	\$49,178	\$109,539	\$22,711
30	\$42,462	\$24,169	\$0	\$7,194	\$73,825	\$169,043	\$33,196
31	\$42,462	\$0	\$6,716	\$0	\$49,178	\$115,760	\$21,532
32	\$42,462	\$0	\$0	\$0	\$42,462	\$102,749	\$18,103
33	\$42,462	\$0	\$6,716	\$0	\$49,178	\$122,333	\$20,415
34	\$42,462	\$0	\$0	\$0	\$42,462	\$108,584	\$17,163
35	\$42,462	\$24,169	\$6,716	\$0	\$73,347	\$192,816	\$28,868

Table 11-5. Annual Cost to Implement Alternative 3C (continued)

Year	O&M/ Monitoring	Setup/ 5-Year Review	Maintenance Construction	Major Construction	Total Cost (PW)	Inflation Adjusted (FW)	Present Value (PV)
36	\$42,462	\$0	\$0	\$0	\$42,462	\$114,749	\$16,273
37	\$42,462	\$0	\$6,716	\$0	\$49,178	\$136,620	\$18,351
38	\$42,462	\$0	\$0	\$0	\$42,462	\$121,265	\$15,428
39	\$42,462	\$0	\$6,716	\$0	\$49,178	\$144,378	\$17,399
40	\$42,462	\$24,169	\$0	\$7,194	\$73,825	\$222,806	\$25,432
41	\$42,462	\$0	\$6,716	\$0	\$49,178	\$152,577	\$16,496
42	\$42,462	\$0	\$0	\$0	\$42,462	\$135,428	\$13,869
43	\$42,462	\$0	\$6,716	\$0	\$49,178	\$161,240	\$15,640
44	\$42,462	\$0	\$0	\$0	\$42,462	\$143,118	\$13,149
45	\$42,462	\$24,169	\$6,716	\$0	\$73,347	\$254,140	\$22,116
46	\$42,462	\$0	\$0	\$0	\$42,462	\$151,245	\$12,467
47	\$42,462	\$0	\$6,716	\$0	\$49,178	\$180,072	\$14,059
48	\$42,462	\$0	\$0	\$0	\$42,462	\$159,833	\$11,820
49	\$42,462	\$0	\$6,716	\$0	\$49,178	\$190,297	\$13,330
50	\$42,462	\$24,169	\$0	\$7,194	\$73,825	\$293,670	\$19,484
TOTALS	\$2,165,550	\$265,861	\$167,904	\$35,970	\$2,635,285	\$5,718,001	\$1,459,195

11.4 Expected Outcomes of Selected Remedy

Implementation of Alternative 3C will result in the following:

- Site-specific MEC awareness training that may include pamphlets, coloring books for children, maps of the site showing restricted areas (including wallet-card size maps) for residents, visitors, and contractors;
- Continued use of the excavation permit process (including intrusive construction restrictions) and enforcement of site access restrictions;
- Site- or project-specific munitions awareness education, depending on the residual risk and/or receptor group (on-site UXO technician construction oversight for all intrusive activities is not required);
- Notification of local law enforcement (or other first-responders) upon discovery of MEC item;
- Long-term management, annual review, and annual reporting of LUC performance;
- Environmental restrictions will run with the land, be binding upon occupants and users of JPHC, and be incorporated into documents, partnerships, and contracts between the Navy and those responsible for carrying out ground-disturbing activity on the Navy's behalf at the site (e.g., such as leases and statements of work);
- CERCLA 5-year reviews that include evaluation of the response actions to ensure continued protectiveness of the selected remedy; and
- Provision for performing additional investigation or response actions based on evaluation of data from LUCs described above or future discovery of MEC items.

The expected outcome after implementation of Alternative 2B is the use of the intertidal zone for shellfish harvesting after the health-related shellfish harvesting advisories are removed.

12. STATUTORY DETERMINATIONS

Under CERCLA and the NCP, the lead agency must select remedies that are 1) protective of human health and the environment, 2) comply with regulations, 3) are cost-effective, and 4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against off-site disposal or untreated wastes.

12.1 Protection of Human Health and the Environment

The selected remedy protects human health by reducing the potential for DMM-HE to be present in areas where DMM-HE items were discovered in Phase 2 of the RI. The excavation of remaining anomalies in the intertidal area will reduce the risk to future shellfish harvesters or other users of the intertidal area.

The remedy continues and strengthens the land use controls in place at JPHC in the uplands areas where metallic anomalies will remain after the removal alternatives are implemented. The no action alternative is not protective of human health and is not consistent with Navy policy.

12.2 Compliance with ARARs

The selected remedy complies with ARARs as listed on Table 12-1. No waiver of ARARs is required.

12.3 Cost Effectiveness

EPA standards that must be followed in selecting remedies for CERCLA releases are included in 40 CFR 300.430(a)(1)(iii). The selected remedy uses a combination of engineering and institutional controls in the uplands area of JPHC where residual MEC items pose a low long-term threat or where full treatment is impracticable and treatment (removal) of potential MEC items where DMM-HE items were located in the uplands and intertidal areas of JPHC.

The existing LUC program at JPHC has been readily implementable and has provided protection for human health and the environment. Alternative 3C expands on the existing program by adding enhanced MEC awareness and response training for managers of the excavation permit process and contractors.

Alternatives 2A and 2B provide a permanent reduction in the number of metallic anomalies in areas of JPHC where DMM-HE items were present. The potential hazards to human health and the environment may be reduced if additional DMM-HE items are removed in the uplands and intertidal zone at JPHC as a result of removal actions associated with the implementation of Alternatives 2A and 2B.

12.4 Utilization of Permanent Solutions

Eight DMM-HE items were discovered and removed from OU 3T JPHC during the RI. Alternatives 2A and 2B will permanently remove anomalies that may be DMM items from upland intertidal areas of JPHC.

The Navy has determined that LUCs will remain in effect as long as there is a potential explosive hazard at JPHC. The Navy has also determined that the combination of the removal actions in Alternatives 2A and 2B, combined with the ongoing use of LUCs, will limit the potential pathways for human exposure to MEC. The Navy believes that the selected remedy provides the best balance in tradeoffs in consideration of the five balancing criteria and the preference for treatment as a principal element. Long-term effectiveness of the remedy will be provided through annual reporting that summarizes training and excavation permit activity, combined with the 5-year review of the implementation of the remedy.

12.5 Preference for Treatment as a Principal Element

The selected remedy includes removal of more than 18,000 metallic anomalies from OU 3T JPHC. Alternatives 2A and 2B may reduce the volume of DMM-HE items if these items are found during implementation of these components of the selected remedy.

The continued implementation of LUCs would not apply any treatment to residual MEC items remaining at JPHC unless encountered during the course of normal operation, maintenance, or construction at the site and, therefore, would not reduce the toxicity, mobility, or volume of MEC through treatment. Alternative 3C defines a comprehensive system to manage the remaining low explosive hazard at JPHC.

12.6 CERCLA Five-Year Review Requirements

CERCLA requires a 5-year review for sites where the remedial action does not allow for unlimited use and unrestricted exposure. The remedy for OU 3T JPHC includes LUCs that will maintain education and awareness programs in conjunction with a comprehensive dig permit program. These LUCs will remain in effect as long as there is a potential explosive hazard at JPHC. The remedial action to remove all remaining detected anomalies in the intertidal area will remove the access restriction related to potential explosive hazards associated with encounters with DMM with HE in these areas. This includes access restrictions that currently prevent shellfish harvesting. Shellfish harvesting in these areas may be restricted due to Health District advisories unrelated to potential encounters with DMM items with HE; however, access restrictions would be lifted to allow this land use when these Health District advisories are no longer posted.

The selected remedy will comply with the EPA Region 10 Final Policy on the Use of Institutional Controls at Federal Facilities (EPA 2009). These requirements include an initial institutional control status report, annual monitoring reports, and 5-year review of the implementation and effectiveness of the institutional controls as long as there is a potential explosive hazard at JPHC. In addition, the policy requires prior notification to EPA and the state in the event of a change of status of the site (i.e., private control of the site or other change in land use).

Table 12-1. ARAR and TBC Summary

ARAR or TBC	Alternative(s)	Evaluation for the Applicable Alternatives	Evaluation for Non-Applicable Alternatives
Federal – Location Specific			
Clean Water Act (CWA); Dredge and Fill and Rivers & Harbors Act	Applicable to Alternatives 2A, 2B	These three alternatives include ground-disturbing activities that could affect waters of the U.S. During site excavation work within streams, intertidal or tidal areas, and/or wetlands, methods to lessen the impact to these areas will be implemented.	Alternative 3C ^{1/}
Coastal Zone Management Act (CZMA)	Applicable to Alternative 2B	This alternative involves ground-disturbing activities that are within the coastal zone (intertidal zones). This alternative requires that actions be consistent with the enforceable policies of the Washington Shoreline Management Act (see State–Location Specific).	Alternative 3C ^{1/}
Endangered Species Act (ESA)	Applicable to Alternatives 2A, 2B	The Navy will perform a biological assessment to determine the potential effect of actions on threatened or endangered species and to consult with federal natural resource agencies as appropriate to determine appropriate measures to implement to lessen the likelihood of an impact because there have been threatened and/or endangered species identified in the project area.	Alternative 3C ^{1/}
Fish and Wildlife Coordination Act	Applicable to Alternative 2B	Activities within the intertidal zone may affect essential fish and wildlife or their habitat during shoreline modification to remove anomalies. The Navy will implement measures to limit water pollution and damage to wildlife resources during ground-disturbing activities.	Alternative 3C ^{1/}
Protection of Wetlands – Executive Order 11990	A TBC for Alternative 2B	Equipment may be placed, MEC detonation, or excavation within the tidal areas and/or wetlands will occur in Alternative 2B. The Navy will evaluate whether wetlands exist in the project area and will consider the potential effects and actions necessary to minimize their destruction or loss by project activities.	Alternative 2A involves 3 upland grids that are not within a wetland or in proximity to a wetland. Alternative 3C ^{1/}
Magnuson-Stevens Fishery Conservation and Management Act	Applicable to Alternative 2B	Ostrich Bay may be considered essential fish habitat for salmonids and groundfish (Navy 2007). The Navy will evaluate the potential for adverse effect for work in the intertidal zone during preparation of the biological assessment and will consult with the National Marine Fisheries Service if it is determined that there may be an effect.	Alternative 2A involves 3 upland grids where ground-disturbing actions will not adversely affect essential fish habitat. Alternative 3C ^{1/}
Migratory Bird Treaty Act	Applicable to Alternatives 2A, 2B	Applicable for these alternatives should activities such as brush cutting or movement of heavy equipment affect migratory birds or their habitat. The Navy will evaluate this and coordinate with the appropriate agencies as required during preparation of the biological assessment.	Alternative 3C ^{1/}

Table 12-1. ARAR and TBC Summary (continued)

ARAR or TBC	Alternative(s)	Evaluation for the Applicable Alternatives	Evaluation for the Non-Applicable Alternatives
Bald and Golden Eagle Protection Act	Applicable to Alternatives 2A, 2B	Applicable for these alternatives because there are two bald eagle nests located south of the JPHC location. Project activities are not likely to impact bald eagles because the eagle nests are in close proximity to a busy highway and nearly constant noise and project activities are not likely to exceed these noise levels near the nests.	Alternative 3C ¹⁷
Marine Mammal Protection Act	Applicable to Alternative 2B	Based on prior biological evaluations at JPHC, it is unlikely that these species will be present in the project area and there is no critical habitat designation for these species in or along the shorelines of Ostrich Bay. If there is a siting in the vicinity, the Navy will consult with appropriate agencies to ensure appropriate mitigation measures are considered.	Alternative 3C ¹⁷
National Historic Preservation Act	Applicable to Alternatives 2A, 2B	Historic and cultural resources have been identified in the JPHC area. Several archaeological and cultural resource investigations at JPHC have been performed with coordination through the State Historical Preservation office and the Suquamish Tribe and protection strategies for these resources, including preservation of the shell midden on Elwood Point, have been identified. The Alternative 2 investigation areas are located in "no" and "low" probability areas; however, a portion of the Elwood Point shell midden may be present within the intertidal zone and must be considered for protection. The archaeological resource protection plans prepared for the RI will be consulted to ensure excavations performed in each of the Alternative 2 areas consider the appropriate mitigation, notification, or monitoring activities, and another Section 106 consultation will be performed for ground-disturbing activities for the selected remedy as required.	Alternative 3C ¹⁷
Native American Grave Protection and Repatriation Act	Applicable to Alternatives 2A, 2B	Applicable for these alternatives because excavation of soil and sediment will occur and there is a potential for Native American cultural items to be present. Future project plans will include procedures and appropriate mitigation and notification requirements should suspected cultural items be discovered during intrusive activities.	Alternative 3C ¹⁷
Land Use Controls at Federal Facilities	Applicable to Alternatives 2A, 2B, and 3C	A TBC for these alternatives because they involve reliance on institutional controls as part of the remedy pursuant to CERCLA. The short- and long-term effectiveness of Institutional controls will be maintained by the Navy as part of the alternative in accordance with the CERCLA annual and five-year review process.	

Table 12-1. ARAR and TBC Summary (continued)

ARAR or TBC	Alternative(s)	Evaluation for the Applicable Alternatives	Evaluation for the Non-Applicable Alternatives
State – Location Specific			
Washington Shoreline Management Act	Applicable to Alternative 2B	Applicable because the intertidal areas being investigated are within the coastal zone. The JPHC location must also be consistent under this Act with the City of Bremerton Shoreline Master Program and the Kitsap County Shoreline Management Master Program. Guidelines for local regulation of shoreline protection may be relevant and appropriate for activities related to the remedy.	Alternative 2A involves three upland grids where activities will not impact the coastal zone. Alternative 3C ^{1/}
Washington Hydraulic Projects Approval	Applicable to Alternative 2B	Applicable because the intrusive investigation has the potential to change the shoreline bed and may affect fish habitat. The Navy will consult with U.S. Fish and Wildlife Service during the biological assessment and will implement appropriate measures to minimize effect on fish habitat such as observing fish windows.	Alternative 2A involves three upland grids where activities will not impact the coastal zone. Alternative 3C ^{1/}
Federal – Chemical Specific			
Clean Water Act	Applicable to Alternatives 2A, 2B	Applicable for these alternatives because of the potential for discharges to surface waters during intrusive or ground-disturbing activities, namely, the migration of sediments into surface waters during these operations. The Navy will include provisions in project plans to minimize the migration of sediment during ground-disturbing or material stockpiling activities in the intertidal and upland portions of JPHC.	Alternative 3C ^{1/}
Water Pollution Control Act	Applicable to Alternatives 2A, 2B	Applicable because of the potential for releases of petroleum product from heavy equipment operations during the remedial action, because a breached or leaking MEC item could be discovered, and because of increased turbidity or runoff potential due to ground-disturbing activities being performed. Project plans will include appropriate measures to address spill prevention and response, stormwater runoff mitigation, and turbidity minimization strategies similar to what has been done at JPHC on other projects.	Alternative 3C ^{1/}
Washington State Model Toxics Control Act	Applicable to Alternatives 2A, 2B	Applicable because soil and sediment handling causes a potential for encountering MC. Should potential chemical contamination be discovered during the investigation, applicable actions, including any sampling and analysis, will be evaluated on a site-specific basis to protect human health and/or the environment.	Alternative 3C ^{1/}

Table 12-1. ARAR and TBC Summary (continued)

ARAR or TBC	Alternative(s)	Evaluation for the Applicable Alternatives	Evaluation for the Non-Applicable Alternatives
Federal – Action Specific			
Clean Air Act	Relevant and Appropriate for Alternatives 2A, 2B	Relevant and appropriate for these alternatives because detonation activities or thermal flashing activities may occur which generate fine particulates (PM ₁₀) emissions or other activities that could generate fugitive dust such as excavation of soil. Project plans will include proper best management practices (BMPs) and standard operating procedures for conducting these operations within industry standards and procedures that have been used at JPHC for similar work.	Alternative 3C ¹⁷
	Relevant and Appropriate for Alternatives 2A, 2B, and 3C	Relevant and appropriate for these alternatives for air releases that would occur during MEC response actions that utilize commercially available equipment to demilitarize explosives. If unstable material is encountered requiring on-site detonation for either Alternatives 2 or 3, a Level 1 or 2 emergency response action will be initiated and performed in compliance with the requirements of NAVSEA OP 5 (NAVSEA 2009) and applicable Navy EOD publications.	
	Department of Defense (DoD) Ammunition and Explosives Safety Standards	JPHC is a DoD facility (whether currently or formerly owned) and even without continuation of baseline LUCs and residential land use, procedures by this standard must be in place to protect the public or residents in the event a suspected hazardous item is found on the property (e.g., initiating a 911 and/or Base Response action and subsequent handling through EOD or other emergency responder). A TBC for Alternatives 2 for determination of clearance depth using site-specific information including site conditions and planned land use. A TBC for Alternative 3C in providing MEC oversight of construction activities based on clearance depth and planned land use.	
	Applicable for Alternatives 2A, 2B, and 2C	Applicable for Alternative 2 for the storage of munitions and the siting of magazines on-site under the authority of DDESB. The Navy will follow these standards in planning future activities and work plans will incorporate these requirements as they have during prior JPHC actions.	

Table 12-1. ARAR and TBC Summary (continued)

ARAR or TBC	Alternative(s)	Evaluation for the Applicable Alternatives	Evaluation for the Non-Applicable Alternatives
Resource Conservation and Recovery Act (RCRA) Subtitle C	Applicable for Alternatives 2A, 2B, and 3C	<p>Applicable for these alternatives should any waste, including military munitions, be generated on-site which meet the definition of a solid waste and be either listed or characteristic waste (hazardous waste). The removal and management of DMM (including storage on-site) must be done in accordance with the RCRA and DDESB standards. Management of DMM as Level 1 or 2 emergencies (for Alternatives 2 and 3) have some exemptions from RCRA Generator and Transportation requirements as addressed under the provisions of the Military Munitions Rule. The rule clarifies that persons responding to explosives and munitions emergencies are not subject to RCRA generator, transporter, or permit requirements (§ 262.10[i] and § 263.10[e]). After the emergency has passed, however, any additional waste management activities may be subject to RCRA and will be handled by the Navy in compliance with RCRA and the Military Munitions Rule.</p> <p>For Alternative 2, the Navy will prepare and implement a Disposal Plan to detail how Level 1 and 2 emergencies as well as DMM handling not considered an emergency will be managed. For Alternative 3, standard operating procedures will be in place for MEC construction support and procedures for notifying and handling DMM emergencies in accordance with the DoD Ammunition and Explosive Safety Standards.</p>	
RCRA Management of Military Munitions	Applicable for Alternatives 2A, 2B, and 3C	<p>Applicable for these alternatives should munitions be discovered which are considered a solid waste and establishes definitions and criteria for management of military munitions during explosive emergencies.</p> <p>For Alternative 2, Level 1 or 2 emergencies will be handled by EOD MU 11 Det. Bangor personnel, while items not considered as Level 1 or 2 emergencies will be handled by contractor and disposed of at a commercial facility (also see RCRA above). A Disposal Plan will be developed with the Work Plans to detail how Level 1 and 2 emergencies as well as DMM handling not considered an emergency will be managed as has been done for other JPHC fieldwork.</p> <p>For Alternative 3, the Military Munitions Rule is applicable should any suspected DMM item be encountered. In this case, EOD MU 11 Det. Bangor would be contacted and either a Level 1 or 2 emergency would be initiated, followed by all subsequent handling of any confirmed DMM by EOD MU 11 Det. Bangor, including in-place disposal and/or off-site transportation to Keyport Annex.</p>	

Table 12-1. ARAR and TBC Summary (continued)

ARAR or TBC	Alternative(s)	Evaluation for the Applicable Alternatives	Evaluation for the Non-Applicable Alternatives
RCRA Subtitle D	Applicable for Alternatives 2A, 2B	Applicable to these alternatives for wastes generated on-site that are solid waste but are not a hazardous waste. All project wastes, including recyclable materials generated during project activities, will be managed and disposed of in accordance with this subtitle.	Alternative 3C ^{1/}
Hazardous Materials Transportation Act	Applicable for Alternatives 2A, 2B	Applicable for these alternatives should any hazardous materials or wastes be offered into transportation on public roads, including proper training for on-site workers engaged in a hazardous material function. Project work plans will include the proper training and waste management requirements to address the shipment of hazardous materials, including waste.	Alternative 3C ^{1/}
Clean Water Act	Applicable for Alternatives 2A, 2B	Applicable for these alternatives because of the potential for discharge of materials into storm water because ground disturbance will occur. Project plans will include appropriate Best Management Practices such as erosion control to prevent runoff or runoff.	Alternative 3C ^{1/}
State – Action Specific			
Washington State Transportation of Hazardous Materials	A Applicable for Alternatives 2A, 2B	Applicable for these three alternatives because hazardous materials could be offered into transit on public highways during non-Level 1 or 2 emergencies (for DMM) or other hazardous wastes and materials.	Alternative 3C ^{1/}
Washington State Hazardous Waste Management Act	Applicable for Alternatives 2A, 2B	Applicable for these three alternatives because hazardous waste could be generated on-site and offered into transit on public highways during non-Level 1 or 2 emergencies (for DMM) or other potential hazardous wastes should they be generated. Washington State definition of Dangerous Waste includes hazardous waste (federal) and additional waste designation criteria as identified in the Washington Administrative Code 173-303. On-site storage and management of Dangerous Waste will be identified in the project plans.	Alternative 3C ^{1/}
Washington State Solid Waste Management Act	Applicable for Alternatives 2A, 2B	Applicable for these alternatives because of the generation of excavated soil, shoreline debris, and munitions (as well as scrap metal) that are generated during the investigation and remediation activity which will require management and disposal. On-site storage and management of solid waste will be identified in the project plans.	Alternative 3C ^{1/}
Fugitive Dust Control Measures	Applicable for Alternatives 2A, 2B	Applicable for these alternatives because of the potential for generation of fugitive dust emissions during soil excavation or thermal flashing operations. Project plans will include BMPs to minimize fugitive dust generation using best available control technology and will include use of standard operating procedures for thermal flashing operations.	Alternative 3C ^{1/}

Table 12-1. ARAR and TBC Summary (continued)

ARAR or TBC	Alternative(s)	Evaluation for the Applicable Alternatives	Evaluation for the Non-Applicable Alternatives
Washington State Clean Air Act	Applicable for Alternatives 2A, 2B	Applicable for these alternatives because they involve soil excavation activities that could generate suspended particulates and fine particles that could affect ambient air quality standards. Project activities will be performed to minimize air emissions and the suspension of fine particles through Best Management Practices and best available control technology for soil excavation and fugitive dusts and use of established standard operating procedures for operations such as thermal flashing.	Alternative 3C ^{1/}

Notes:

1/ Alternative 3C involves MEC construction oversight, including initiation of a Level 1 or 2 DMM Emergency (if required), but no ground-disturbing activities or other physical activity will be performed as part of a remedial action pursuant to CERCLA. The project activities for which MEC construction oversight may be required will be subject to their own applicable regulatory review to determine appropriate requirements that must be met, including any permit coverage.

Citation Reference for each identified ARAR/TBC in order of appearance:

Location-Specific-Federal

Clean Water Act: Dredge and Fill; and Rivers & Harbors Act: 40 CFR 320.1 et seq., 401, 404 et seq., 33 USC 1314; 320, 323, 40 CFR Part 230; Section 10 (33 USC 403; 33 CFR Parts 320, 322

Coastal Zone Management Act: 16 USC 1451-1464; 15 CFR 921-933

Endangered Species Act: 16 USC 1531-1544; 50 CFR 17, 401-424, 450-453

Fish and Wildlife Coordination Act: 16 USC 661 et seq.

Protection of Wetlands: Executive Order 11990

Magnuson-Stevens Fishery Conservation and Management Act (1996): 16 USC Section 1851 et seq.

The Migratory Bird Treaty Act: 16 USC 701-712

The Bald and Golden Eagle Protection Act: 16 USC 668-668(d)

Marine Mammal Protection Act: 16 USC 1361, 50 CFR 12

National Historic Preservation Act: 16 USC 470(f), Section 106; 36 CFR Parts 60 and 63 and 800; 40 CFR 6.301

Native American Grave Protection and Repatriation Act: 25 USC 3001-3013; 43 CFR Part 10

Land Use Controls at Federal Facilities: EPA Region 10 Final Policy on the Use of Institutional Controls at Federal Facilities

Location-Specific-Washington

Washington Shoreline Management Act: Chapter 90.58 RCW; Chapters 173-26, 173-22, and 173-27 WAC

Washington State Hydraulic Projects Approval: Chapter 77.55 RCW; Chapter 220-110 WAC

Chemical-Specific-Federal

Clean Water Act: 33 USC Section 314, 1251-1387; 40 CFR 100-149; 401 et seq.; 33 USC Section 304

Chemical-Specific-Washington

Water Pollution Control Act: Chapter 90.48 RCW; Surface Water Quality Standards (Chapter 173-201A WAC); Chapter 173-201A-070 (WAC)

Washington State Model Toxics Control Act: Chapter 70.105D RCW; Chapter 173-340 WAC

Action Specific-Federal

Clean Air Act: 40 CFR 51.40 et seq.; 42 USC 1857-18571; 40 CFR 50-100; 40 CFR 131

DoD Ammunition and Explosives Safety Standards: DoD 6055.9-STD

Resource Conservation and Recovery Act Subtitle C: 42 USC 6921-6925; 40 CFR Parts 261-265 and 268

RCRA Management of Military Munitions Rule: Military Munitions Rule (40 CFR 260 through 265 and 270)

RCRA Subtitle D: 42 USC 6941-6949; 40 CFR Parts 275, 258

Table 12-1. ARAR and TBC Summary (continued)

Hazardous Materials Transportation Act: 49 USC 5101-5127; 49 CFR Parts 171-173, 177

CWA: 40 CFR 401, et seq.

Action-Specific-Washington

Washington State Transportation of Hazardous Materials: Chapter 46.48 RCW; Chapter 446-50 WAC

Washington State Hazardous Waste Management Act: Chapter 70.105 RCW; Chapter 173-303 WAC

Washington State Solid Waste Management Act: Chapter 70.95 RCW; Chapter 173-351 WAC

Fugitive Dust Control Measures: Puget Sound Clean Air Agency (PSCAA) Regulation I, Section 9.15

Washington State Clean Air Act: Chapter 70.94 RCW; Chapters 173-400 and 173-470 WAC

**13. DOCUMENTATION OF SIGNIFICANT CHANGES
FROM PREFERRED ALTERNATIVE OF PROPOSED PLAN**

The Proposed Plan presents the preferred alternative for OU 3T JPHC. There are no significant changes to the preferred alternative presented in the Proposed Plan.

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14. RESPONSIVENESS SUMMARY

The public comment period was from November 1 to December 15, 2010. A public meeting was held on November 15, 2010, at the Jackson Park Community Center. Despite the notices and postings regarding the comment period and notice of public meeting, there were no attendees at the meeting and no comments from the general public were received on the Proposed Plan. The Navy received a letter from the Suquamish Tribe in support of the Proposed Plan.

14.1 Verbal Comments Received at the Public Meeting

No verbal comments were received at the public meeting.

14.2 Written Comments on the Proposed Plan

The Suquamish Tribe submitted written comments to the Navy on December 14, 2010, in support of the preferred alternative:

“This area is a significant natural and cultural resource for the Suquamish Tribe, whose contact and connection to the area predates European contact and the Navy's occupation. The site is within the exclusive usual and accustomed fishing area (U&A) of the Suquamish Tribe. By treaty, the Tribe has reserved fishing access rights and rights to harvest natural resources.

“The Tribe supports the preferred alternative as described in the proposed plan. As a component of the preferred alternative, Alternative 2B provides for the removal of 100 percent of detected subsurface anomalies in the 42-acre intertidal area. By potentially reducing the risk related to explosive hazards, this component supports unrestricted access to intertidal areas for future land use activities including shellfish harvesting.

“The Tribe looks forward to continuing to work with the Navy and EPA in implementing the OU 3T remedy.”

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15. REFERENCES

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